OCT 22 1926

THE GEOGRAPHICAL JOURNAL

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The Geographical Journal

Vol. LXVIII No. 4 October 1926

THE KABBA PROVINCE OF THE NORTHERN PROVINCES, NIGERIA*

C. R. Niven, A.D.O.

THE Province of Kabba lies between 7° 15′ and 8° 45′ N. lat. and 5° 30′ and 7° E. long., a position a little south of the centre of Nigeria. It has an area of approximately 5099 square miles and a mixed population of over 200,000 souls. Except for one sector it embraces the confluence of the Niger and Benue, from which it extends down the former river for about 30 miles and upstream for about 80. On the east bank of the Niger, between the Benue on the south and the Gurara on the north-west, the Koton-Karifi District, a long strip of country with a maximum width of 20 miles, draining into that river, forms part of the province. The drainage of over three-quarters of the province is into the Niger or Benue: in the west the drainage is northerly or southerly; to the north it finds its way into the Niger by the roundabout course of the Kempe River, and to the south goes direct to the sea by the Ose River. To the west lies the Ilorin Province; north of the Niger the Province of that name; east of Koton-Karifi the Nassarawa Province; and in the south-eastern sector between the Niger and the Benue, the Munshi Province.

The Province is administered from Lokoja, the well-known station on the confluence, and is divided into the three administrative districts of Igbirra, Kabba, and Koton-Karifi, to each of which a Political Officer is posted.

At present the town of Lokoja has a native population of nearly 10,000 people, from a vast variety of tribes, the greater part of whom are traders and brokers. These men do not farm or produce food-stuff, a condition which accounts for the high cost of living that prevails there, since practically all the supplies are imported from distances as great as 60 miles, and pass through many hands to each of which there adheres a little profit. Much of this benefit is reaped by the inhabitants of the Koton-Karifi District and the canoemen of the river. The native town runs along the west bank of the Niger for over 3 miles in a long strip between the escarpment of Patti Lokoja and the river, while the European

* The paper deals with the Kabba Province as constituted between November 1921 and May 1926, before the inclusion of the Idah Division.

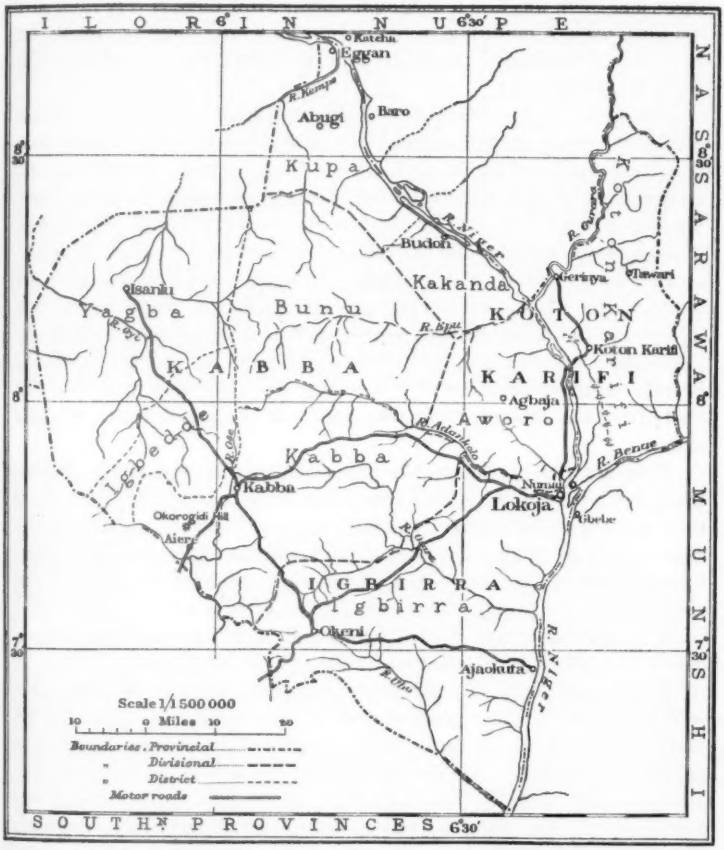
station lies to the south on three spurs of the hill, which here is rather refused to the river front. During the early rains, when the landscape is covered over with the fresh green of young vegetation, showing here and there the red of the hillside, the houses and bungalows of Lokoja have a singular beauty. Patti rises some 1000 feet above the river, and from the rest-house on the edge of the steep slope one sees the native town spread out below: behind it the blue waters of the Niger stretch to right and left for many miles, and the broad Benue recedes eastwards into the blue distance: between the great rivers green marshland turns to cultivation and rises into the heights of the Koton-Karifi and Munshi hills.

The territory of the chief of Koton-Karifi lies to the east of the Niger and north of the Benue, and is some 600 square miles in area. Immediately adjoining the river is a strip of lowland, averaging about 3 miles in width, which for most of the year is a swamp. This consists of tall swamp grasses and reeds, with belts of dense forests, where mangroves thrive, or where huge trees rise straight and clear, their lines unbroken by branch or leaf, until they burst into a delicate groining far up towards the sunshine. When the rivers rise this area is submerged, and the numerous villages in it, inhabited by fishermen and canoemen, become little Venices.

Further away from the rivers is the edge of the escarpment, the lowest step of the plateaux rising ultimately to the heights of Bauchi. Along the foot of this, surrounded by rich farm lands, are the more important villages, including the town of Koton-Karifi, which is the administrative headquarters of the Koton-Karifi division. These are for the most part inhabited by Igbirras: farmers, craftsmen (smiths, dyers, tailors, scribes, etc.), and traders. Their wives also engage in petty trade, some even on an extensive scale. On the flat top of this plateau are many villages of the Bassa Komo and Gwaris, and in the hills of Tawari is the remnant of an important Bassa Komo (Mbiriki) state. On the north-west is the River Gurara, one of the boundaries of the province; a stream that winds its way through narrow valleys or at the foot of rocky crags. At Gerinya, an important market from which Lokoja derives most of its supplies, it attains a width, between banks, of 750 feet, but in the dry season a child can ford it.

To the west of the Niger and opposite Koton-Karifi, a similar high plateau rises directly from the river for about 30 miles north of Lokoja, and forms the Agbaja plateau and Patti Lokoja, which were originally one hill. They have wooded sides, and on the summits are open glades of fine low grass flourishing on the thin layer of soil that covers the flat ironstone rocks. The average height of these hills is about 1200 feet above sea-level; at the point nearest the river they are about 1000 feet, and farther west 1400. Together with the Koton-Katifi hills these form the valley of the Niger: at Koton-Karifi this valley is about 4 miles wide,

and at Lokoja 10. They are deeply indented, in some places for many miles; in fact, Patti Lokoja and Emu Hill (further west) are only isolated fragments of the Agbaja Plateau: no doubt this plateau represents the original level of the country before it was cut into by the Niger and its tributaries. North of the Agbaja plateau there are some more isolated flat-topped hills of the same height and appearance that gradually recede



Sketch-map of Kabba Province, Northern Nigeria

from the river line, leaving a wide belt of swamp and forest. Many of these hills are sacred and have only been climbed by the priest of their cult. To the north again the hills become lower and further from the river, receding westerly and following the course of the river, which changes its direction near Baro, leaving about 20 miles of lowland and swamp on the right bank.

From Eggan, which is a large Nupe village entirely cut off by water in the rains, to Lokoja there is a narrow strip of territory constituting the Aworo District, with headquarters at Agbaja on the plateau of that name, some 13 miles north of Lokoja. The Eggan area is now but the shadow of its former self. In the early days it was a thriving community with a great trade. The Niger Company established a big store there, and there was also a telegraph office. Now there is very little save the town itself, a multitude of native huts on a crumbling sandbank, for most of the trade has gone across the river to Katcha, a market on the Baro-Minna Railway.

The areas of the Kupas and Kakandas stretch halfway to Lokoja on the west bank, and also form a part of the Aworo Native Administration. Abugi, the town of the Etsu of Kupa, is some 10 miles inland from the river, but it is none the less almost unapproachable in the rains, because of the sea of mud in which it stands. The Kupas are reputed to have come from Katsina or Sokoto, but they have no trace of Hausa in their speech, which is a corruption of Nupe. The Kakandas, to the south of the Kupas, are quite a distinct people, and are believed to have come down the Benue from the old Jukun Empire at much the same time as the Igbirras of Koton-Karifi and Okeni and the Igarras of Idah, to whom they are related. They held their lands in fealty from the Atta of Idah, who approved the appointment of their chiefs.

They are, par excellence, the canoemen of this part of the Niger; the greater part of the water-borne trade is in their hands; they have their Kakanda quarters in all the larger river-side towns, and most of the canoe songs of the river-men are in the Kakanda dialect, which is often unintelligible to the singers, but this does not diminish the zest and the charm of their singing. The chief lives at Budon, a town on the west bank of the Niger, where each compound is on a separate sand-dune and where, in the rains, communication is by canoe alone.

When travelling downstream, the canoes, filled with cargo and weighed down till their gunwales are almost awash, are propelled by rectangular sails or by short sharp paddles, with lavishly carved and embellished blades. Against the stream the downward journey of a day may take three or four days; the canoes hug the banks and are toilsomely pushed along by poles. Most of the canoes are dug-outs about 30 feet long and 3 or 4 wide: many of them have a gunwale attached to give additional and extremely necessary freeboard. They always appear to the untutored and nervous European eye to be about to sink: water oozes in everywhere in spite of the enthusiastic caulking of the occupants, but they do not sink very often. There is also a small fishing canoe, which is built of two dug-outs, each half a canoe, which are joined together amidships with a little creeper rope. It is very difficult to understand why they float, as the join is a very elementary affair,

Egumbe hill

Odda hill, Ogidi

A "wash out" on Kabba–Okeni road

An Igbirra rainmaker

and there is always water in the bottom of the canoe. These are about 15 to 20 feet long and about 18 inches wide.

The Aworos, who live to the south of the Kakandas, are a very dull and unenterprising race, appearing in many ways to be more primitive, and yet in others more sophisticated, than their neighbours. They do little save farm, which they do well enough, and make a little rough matting, not comparable with that of the Kakandas. Their plateau is fringed with fishing villages of Igbirras and Kakandas.

South of Lokoja the country changes its character completely. The point of difference is roughly the Adankolo River, which flows along the southern foot of Patti Lokoja and enters the Niger about 1 mile south of the station. From this river southward the flat ironstone plateaux, which are such a characteristic of the northern section, disappear almost entirely, and their place is taken by rugged granite outcrops, sometimes only a few feet above the soil, at others rising for many hundreds, tree-clad and precipitous. On the east side of the Niger, however, in the Munshi Province, the table hills are still to be seen, and continue for about 20 miles south of the confluence. There they also give place to the granite, and the river, having to force its way through such substantial walls, becomes much narrower, scarcely half a mile across. This granite belt, running south-east through Kabba, cuts across the north-and-south course of the Niger in the Ilorin Province, and makes it bear south-east from Jebba to Baro; it then turns south again and traverses the narrow trough in the granite range round Ajaokuta.

The people of this section, which administratively forms part of the Igbirra District, are Bassa Nges, who are a branch of the Bassa People on the other side of the Niger, and are vaguely related to the Bassa Komos of Koton-Karifi, though they are now very different in their style of housing, dress, customs, and speech. Their villages are very unprepossessing and dirty, and they live in what most natives would regard as ruins. For the most part, as with all natives, they are farmers, but there are canoemen and fishermen in plenty in the river-side villages.

The principal town of this area is Ajaokuta, on the west bank of the Niger about 30 miles south of the confluence. Ajaokuta is "the Market of the Rock," so called from a large Juju rock that used to be in the river and constituted a danger to navigation. It is the port of the inland Igbirras, and is joined with Okeni, their capital, by a road fit for motors. The women come from 40 or 50 miles to sell their produce to the European firms there, and quite a thriving business is carried on. For a bushel of palm kernels they are given two iron bars and enough money to make up the market price of the kernels: these iron bars are sold on their return to local blacksmiths, who pay twice or three times their value at Ajaokuta. This is a very lucrative business for the women concerned, the more so as it demands no capital whatever, since the palm kernels

An Igbirra rainmaker

A "wash out" on Kabba–Okeni road

being uncultivated, are picked up by those having rights of user over the trees.

About 30 miles west of Ajaokuta is the highland region of the Igbirras. Their villages are on the jagged hilltops of a granite upland that rises from the plain under the first houses. This upland has an average height of about 1400 feet, rising in a westerly direction as far as the watershed of the Ose river system, where the higher points are well over 2200 feet above sea-level. The area, and indeed most of the country between it and the River Niger, is much more bare of trees than the rest of the Province. Swift rivers and torrents drain away the heavy rainfall, and form a serious obstacle to road construction. Already owing to their great denuding effect on the sparse soil, they are forcing the natives to farm far away from home down on the plains. The Igbirra farms are often as much as 20 miles away from their villages.

They are a very hardy race, short and solidly built. They think nothing of walking the 45 miles into Lokoja and returning part of the way the same day, for they are no city men, and the bustle of strangers in Lokoja fills them with terror and a longing for their hills. Their villages are clusters of square compounds clinging to the granite hills, the nearer the top the better: the walls are made of mud put on in handfuls, and retaining that shape, so that from a distance they give the appearance of being herring-boned.

Their villages are surrounded by gardens of tobacco, pepper, and herbs. Each garden is hedged in with tall green cactus, and from far away some of their hillsides look like some English scene strangely distorted. The roofs are dreadful, for they rely on the mud-and-timber ceilings to keep out the rain, and their paths have to be seen to be believed.

On the rim of the cup, hardly more than 5 miles across, which forms the head of one section of the Osara River, draining into the Niger, there is a population of over a hundred thousand of these hill people. They have tended to emerge a little into the headwaters or basins of the Ubo and Ose rivers to south and west, but the bulk of the population is in this cup. Their administrative centre is the town, or rather group of villages, of Okeni, on a hill that reaches a height of over 1,700 feet above sea-level.

Northwards of the Igbirra District lies the Kabba Division, which is about half the total area of the Province, filling all the space between the Igbirras on the south and the Kupas and Kakandas on the north. This is an entirely inland area, and does not touch the Niger anywhere. It continues the highlands of the Igbirra District and contains in the south-west the highest point of the province, Okorogidi, a granite hill which reaches a height of 2500 feet above sea-level, and has a precipitous cliff of 1000 feet as its eastern face. This division falls into three geographical regions according to its drainage: the eastern half drains direct into the Niger by means of the Epu, Adankolo (or Oinyi) and

Osara rivers, and is inhabited by Bunus, with some Aworos in the south; the south-west quarter is the basin of the Ose River, which rises some miles north of Kabba (within a mile of the sources of streams flowing east and north), and runs south to the sea, thereby being the first river west of the Niger in this latitude to reach the Bight of Benin direct. This basin, which is broken by bare granite hills and domes, forming part of the south-easterly granite line previously referred to, is inhabited by the Owe people grouped round Kabba Town, the administrative headquarters of the division. Between the Owes and the Yagbas is wedged the long strip of the Igbeddes, who occupy the forest lands of the divide between the Ose and the Oyi River systems. The basin of the Oyi River, which drains north into the Kempe and thence into the Niger at Eggan, forms the third area, and is inhabited by one section of the Yagba tribe, the other half of which is in the Ilorin Province, in the basin of the Kempe River.

As this province is fairly well populated for a tropical country, there are not a great many wild animals to be found, save in the uninhabited belt, which runs north and south between a line about 6 miles west of the Niger and a line about 10 miles east of Okeni-Kabba, and on the plateaux of Koton-Karifi division, where there are lion, leopard, hyæna, jackal, elephant, rock rabbit, buffalo, roan, hartebeeste, waterbuck, cob, harnessed antelope, diker, various kinds of small monkeys and baboons, porcupines, wild boar, squirrels, rabbits, and others. The natives of the province have much wealth in small pagan cattle, goats, sheep, swine, turkeys, ducks, and chickens, with innumerable nondescript dogs, which are very popular for house, and also for sacrificial, purposes.

They cultivate the usual tropical plants, such as yams, guinea-corn, millet, maize, sweet potatoes, cassava, groundnuts, capsicums, rice, onions, benni-seed, indigo, tobacco and cotton, bananas, pine-apples, and pawpaws. The principal economic trees are the oil-palm, the locust tree, the shea butter tree, the rubber tree and vine, and the "chedia," which gives such a welcome spreading shade in the market-places. Much excellent timber is obtainable, including "iroko" (like mahogany), mahogany itself, and such useful trees as the silk cotton tree (Kapok), and the fan-palm. The more common flowers are the mauve and white begonias, purple gladioli and convolvuli, coreopsis (a large yellow daisy-like flower having a sweet scent), the tulip tree, gardenias, lilies such as the *Glorisa superba* and *Lilium echrinum*, mimosa, and the scarlet pride of Barbados.

Roughly speaking, all the tribes in the Niger–Benue section of the Province are supposed to have been of Jukun origin, and to have come down the Benue River approximately two hundred years ago. In all cases the invading cast (? Jukun) mingled with the inhabitants they found in occupation, so that from intermarriage and interdwelling arose the differences in speech and custom which render them at first sight

almost different peoples. These differences were further increased by contact with their new neighbours. The matter is still much debated, but as far as one can see the probability is that once all the Kabba Province was occupied by Aworos, though whether they were or were not the indigenous inhabitants is impossible to say. On the Kabba side the probability is that the Bunus were the first invaders from the south-west, and that they drove back the Aworos towards the River Niger. They were followed by the small tribe of the Igbeddes, who wandered about in the Ose and Oyi basins cutting off communities of Bunus. Then came two fairly simultaneous invasions up the rivers Ose and Oyi by the Owes and Yagbas respectively, who forced the Igbeddes into the water-shed forests, where they have been ever since: this is largely borne out by the manner in which each tribe is evenly balanced in the river valleys, no village being more than two hours' march away from its river (*i.e.* Ose or Oyi). The native tradition is not helpful in the matter.

In the province some twenty-five languages are in common use, and of them about eighteen belong to tribes the greater part of which are permanently domiciled in the province. The Igbirras of Okeni and Koton-Karifi have similarities in languages which point to a common origin, but the language of the Aworos, Bunus, and other tribes lying west of the Niger and north and north-west of Lokoja are founded on a common Yoruba root, and Yoruba is the Lingua Franca among them, though their own languages are not always intelligible to one who only speaks Yoruba. Hausa is the official language of the Administration, both British and native, and in every village there is usually at least one man who can understand that language, and it is being learnt everywhere. The problem of interpretation is an extremely serious one, and it is no uncommon thing for one's remarks, however elementary and simple, to be translated three times to a small gathering before they all understand.

Considering all this variety of tribe and people it is only possible to touch on the more obvious points of interest. One of the most striking is that both the Gwaris and Bassa Komos of Koton-Katifi carry their loads on the shoulder and not on the head, which is shaved and "belongs to the chief"; that is of course the women of those tribes, for the men never carry anything more weighty than a spear or a long pipe, while their women carry loads up to 90 lbs. for long distances to market. These are supported in or on small conical wooden bowls, the construction of which is a special craft in these tribes; they rest on the shoulder steadied by one hand. This exercise is not conducive to that stateliness of carriage which is typical of the head-carrying native woman.

All the adult peoples of the province are clothed when abroad. While much of the cloth used in the province is cotton imported from England, far more is of local manufacture. West of the Niger among the Kabba tribes and among the Igbirras to a lesser extent, almost every woman is a weaver. Not only do they make up the web and

shuttle themselves, but also they gather the ingredients for their dyes—brown from guinea-corn pith, red from reeds, navy blue from the indigo plant—and make them up for themselves. Their patterns are usually arrangements of lines of simple colours of varying widths and intervals, which are extremely attractive: more ornate patterns are sometimes introduced in double thicknesses. In the Bunu country a special craft is the weaving of "burial cloths" of red, white, and yellow wools (unravelled from European cloths). They are in the form of gigantic bandages about 12 inches wide, and often as much as 30 feet in length, and are employed by the wealthy men of neighbouring tribes. When a rich man dies a strip of this cloth is sometimes thrown over the roof of his house, and there remains until the obsequies are completed. In Koton-Karifi about a third of the women (most of the older ones) are spinners, twisting little bobbins on stones held in their laps, and most of the remainder are weavers who buy from these spinners. Good prices are also obtained in the markets for the local cotton, which hardly suffices local needs. The recovery in the European price of cotton has produced a greater amount of production, and there is likely to be further increases if the price is dependable.

In Koton-Karifi there is an hereditary class of dyers, and outside every village there are to be found their evil-smelling pits. These are usually about 8 feet deep by 3 feet wide and lined with native cement, and are filled to within a foot of the brim. The dye used is that obtained from the indigo plant, pounded up and baked into balls in wood ashes. Many beautiful shades are made from this one dye.

The Bassa Komos of Koton-Karifi make a graceful pottery in bowls of different sizes; they are made by women by hand, and though without a wheel their shape is usually faultless. They are decorated with pitting relieved by fine parallel lines, but their greatest feature is their jet-black colour and highly polished appearance. The black colour is produced by spraying these pots while still red-hot with the water in which guinea-corn has been boiled; the effect is very similar to that of Roman pottery. The price is ridiculously small: a medium pot can be obtained in the Koton-Karifi market for one penny.

The Gwaris of Koton-Karifi are very expert at basket making, and often produce work with artistic patterns. The Kakandas make excellent mats from the leaves of the fan-palm, dyed in various shades and woven with great cunning.

There is a large fishing industry on both banks of the Niger, and on the Benue, by nets of different kinds which have been described exhaustively by many writers; they also employ traps set in little dams in running water. Between the Koton-Karifi hills and the river there is a line of fishing swamps, the rights over which are hereditary and jealously guarded. Sometimes poison is used to stupefy the fish, but its use is not encouraged.

The only native musical instrument that calls for comment is the canoe drum. This is a log of wood about 30 inches long and about 12 in diameter, hollowed out from one end, which is then plugged. A slit about 3 inches wide runs longitudinally down one side for the greater part of the length. The drum is beaten with a stick on the lip of this slit, and the peculiar rhythm of the canoe drums coming across the still water of the Niger, once heard, is not easily forgotten.

All over the province there are native markets, of which the most important are those of Isanlu, Gerinya, Okeni, Ajaokuta, and Koton-Karifi: the first two are the largest, and 2750 and 2500 traders have been counted respectively on an ordinary market day. Each of these represents between 60 and 70 tons of produce brought in for sale each market day; at Isanlu about 20 tons of this is dried fish brought by Nupe women from the Niger. There are intervals between market days: for example, Isanlu is held every eight days, Gerinya every four, Okeni every other day, and so on, while Lokoja market is a permanent one. Almost every village has a market, which is more or less well attended, according to its accessibility and population.

These markets are fed by the network of native paths that join village to village across Africa. The paths are cleared back to a width of 6 feet, but are not "made" in any sense; they are traversable on foot at all times, and where there are reliable bridges they may be used by cycle or motor cycle. These native bridges are very rough and are liable to rot very quickly. Roads fit for motors have been made, and are usually passable, between Lokoja and Okeni and Lokoja and Kabba, between Okeni and Ajaokuta, Southern Provinces (*vid* Ibillo) and Kabba, and between Kabba and Aiere (for Southern Provinces) and Isanlu. A road has also been made north from Lokoja along the west bank of the Niger as far as Jemata; at this point the river is crossed by ferry, and the road continues from Adaha to Koton-Karifi and on to Gerinya on the Gurara, where by means of another ferry contact is made with the roads of the Niger Province and the north.

Cicatricing is very commonly practised among the women, and varies from mere parallel lines filled up with small scars at right angles, like rungs of a ladder, to the elaborate ornamentation of circles and lizards.

Most of the natives are animists, a rather vague expression that may be used of most tribes. They believe that by sacrificial propitiation of the in-dwelling spirits, evil may be averted from their heads. They go to the local juju-man, who by divination, such as the throwing of cowries on squares and other patterns in cloth or beads, complicated with that mass of inessential paraphernalia of sacred skulls (animal) and charmed skins and iron bells that accompany such ceremonies, tells them of some evil that is coming, and orders them to sacrifice a chicken or to put down pounded yam food at a certain place for the use of the spirit. This is

usually at the foot of a rock or big tree, and as the food always disappears, and the ordinary native is far too frightened to take it, it may be assumed that it becomes a profit to the juju-man in addition to his ordinary fee.

Different festivals are intimately connected with the crops, such as the eating of new yams and the time of the guinea-corn harvest. In Kabba some of these festivals are celebrated by a select circle of men on one or other of the sacred hills that overhang the town. In many of the festivals a prominent part is taken by a figure completely dressed in green leaves.

The most prominent feature of the Yoruba-speaking tribes living west of the Niger is the honourable craft of rain-making. All independent chiefs and every chief of importance (except some in Igbedde) are held to have powers of creating or calling rain. The actual ceremonies that are supposed to produce the rain are secret, and can only be inferred to involve the use of sympathetic magic with water, veiled in a cloud of attendant bluff. The power is certainly associated with hills, and the more successful exponents are those that live on hills. In most cases the power rests in the chief, but in some, as at Okeni, it belongs to a follower. At Okeni the Ozumi, who holds this office, bears as a badge a crown of the long pinions that are trailed by the night-flying goat-sucker. These are dark brown, and may be held, symbolically, to represent storm clouds; they are worn during the act of rain-making, but are taken off when it is desired to stop rainfall. Though one cannot credit that these men have power to control the elements, as the native firmly believes, the coincidences that one has observed personally are remarkable, and might even give pause for thought. It is not uncommon to be told by these ancients that you will not have rain, and to march with rain all round you while none falls in the part where you happen to be.

The ordinary native customs of marriage and burial maintain in the province, except that the Bassa Komos still have marriage by capture. This is a formality and no real violence is used, the bride being seized on her way to or from market, but the parents know that it is going to take place, and in most cases so does the lady. Her family are then entitled to capture a bride from the family of the husband. All burials are in the house or compound of the deceased, and take place at once, except in Igbirra, where the body is often smoked and preserved for several months. On the death of an Obaro of Kabba or a chief of Aiere, one or more slaves, in addition to those slaughtered on the roads leading into the town or buried alive with the dead man, were conducted to the top of a rock near the town and pushed over the edge.

As far as is known nothing has been written about this province except for Lokoja, to which reference is often made; not a surprising circumstance considering that Lokoja is a European-made town. It was founded by the ill-fated expedition which reached the Niger in August 1841, with the object of founding a model farm or settlement of trained

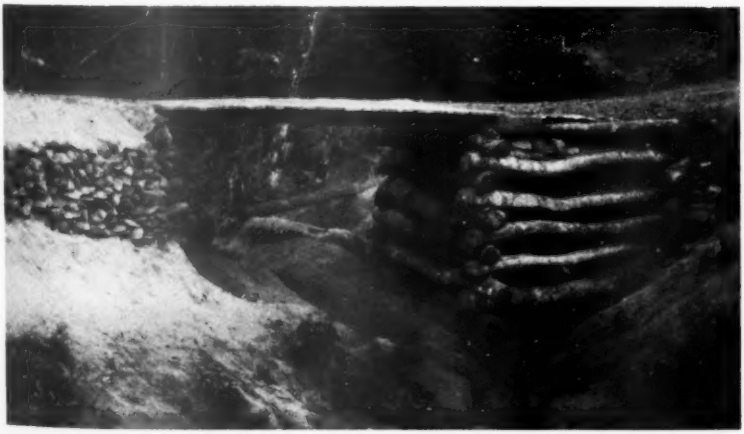
natives from the West Indies and Sierra Leone under European supervision. For this purpose a piece of land was obtained near the confluence of the Niger and Benue from the Atta of Idah, though as to his rights over the site there is still a considerable dispute, by a treaty which was never ratified by the Imperial Government. The site of the model farm was on what Lander called Stirling Hill, a low spur from Patti, near the present Lokoja Market; the whole area granted by the Attah extended from the Ba River just north of Lokoja to the Osara, along the west bank of the Niger. For the best part of a year the colonists remained there, until in the end their labourers mutinied and they were subjected to raids from the Fillani: they were however relieved by the *Wilberforce*, and reached Plymouth in November 1842. The whole expedition had lost 49 Europeans out of a total of 145, and had caused considerable expenditure of capital with no return. Owing to this set-back nothing further took place until 1854, when in August Doctor Baikie passed the place on his entering the Benue, but he returned to the sea without staying at Lokoja for any time. In 1857 Doctor Baikie again had charge of an expedition, and was appointed Consular Agent at Lokoja by the Foreign Office. He came out in the *Dayspring*, which was shortly afterwards wrecked higher up the river, and established his headquarters at Gbebe (opposite Lokoja and a few miles downstream). In 1860 he crossed to the site of the old model farm (at Lokoja), where with the assistance of Glover he formed a native settlement, largely of freed slaves. Thus Lokoja came into being under Baikie's protection, and gradually reached its present site.

During the last hundred years, until the coming of the British Administration, the country was more or less continuously exposed to Fillani raids from Bida. According to native accounts the first European to penetrate the interior of Kabba was an unknown white man who accompanied the Fillani Emir, Umoru Magaji of Bida, on his attack on the Igbirra country about 1875. He would seem to have been a military adviser to the Fillani, and is said to have shot rockets at the Igbirra villages and set them on fire. There are old men still living in Kabba who saw this man, and they give various details such as the fact that he climbed the sacred hill at Kabba and examined the country through a glass.

The first official visitors to the hinterland of Lokoja came in 1895. They were two or three British officers, with a few native soldiers, under Captain Turner, who came from the Igbirras and built a fort on the Ashuta Hill outside Kabba, where they lived for some time and observed the Fillani, who were at Ogidi. In 1897 Colonel Vandeleur with a column of the Niger Company Constabulary marched from Lokoja to Ohura (in Bunu) to intercept the Fillani round Kabba; they marched on Kabba and missed the Fillani, who had retired through Yagba. There was a slight pause at Kabba, and then they marched to the Niger,

Granaries near Aiere, Kabba

On Choko-Choko section of Kabba–Lokoja road



Bridge on Kabba–Isanlu road

Igbirra villagers, near Ajaokuta

Market, Igbirra

Ju-Ju house, Mopa, Yagba

and the Fillani were defeated by them near Egbom. Troops were retained at Kabba until 1904. On 1 January 1900, as is well known, Sir Frederick Lugard took over the Government of Northern Nigeria from the Royal Niger Company, Limited and Chartered, and hoisted the British flag at Lokoja. This remained his headquarters for some time. Kabba was formed into a Province with very nearly its present boundaries (except that it included the Kukuruku and Akoko countries west of the Niger), and was administered from Lokoja with Sir William Wallace as its first Resident. The administrative headquarters were then removed to Kabba, where they remained for some years until transferred to Ilorin. The rest of the Kabba Province was opened up from Kabba. Captain A. G. Uniack explored the Igbedde and Yagba country, and in 1903 an expedition was sent against the Igbirra on account of the continual trouble they inflicted on their more amenable neighbours. Koton-Karifi was explored from Lokoja, and the late Hon. David Carnegie, who achieved fame in Australian exploration, met his untimely death outside the hill village of Tawari in that division, in an attempt to arrest a robber chief.

The accompanying map is the result of a survey carried out in 1922, 1923, and 1924.* It is based on a network of intersecting route traverses, supported by an independent system of hill-points fixed by intersecting rays. The heights are only very rough and were obtained by aneroid and Abney level. Much of the route-traversing lay through country which was covered for the greater part of the year with grass of such height and thickness that one could not see for more than a few yards at a time: surveying was reduced to a painful effort, and only 3 or 4 miles a day could be done. It was therefore necessary to produce a fresh method, and the following has resulted. A man with a drum with another man is sent along the path ahead of the surveyor; he beats his drum at a fairly slow rate. When he has gone far enough the surveyor takes a sight on the sound with his compass and blows a whistle, which is heard by the second man, who stops the drummer. The second man walks a little behind the drummer, so that the whistle shall not be drowned by the sound of the drum. He then marks the place where the drummer was standing with sticks or lines on the ground, and on hearing two blasts on the whistle they go on, drumming slowly as before. The surveyor follows at once, pacing or measuring the distance by perambulator, until he reaches the mark left by the first party. Here he halts and jots down his distance from the starting-point or last halt, takes a sight on to the sound, and blows his whistle as before. Before he takes the sight he may point with a stick in what he conceives to be the direction of the sound, and a man standing behind him can verify this direction

* The sketch-map accompanying this paper is based upon Mr. Niven's work. Photographic copies of his survey on the scale of 1/250,000 and 1/100,000 have been deposited in the Society's Map-room, where they may be consulted.

by looking along the stick over the surveyor's shoulder. The result obtained may be as much as 5 degrees out, but it is never more than the thickness of a pencil-point drawing on a fair scale. The distance between the surveyor and the drummer may be lengthened by letting the latter walk on while the former stands at the station, or be shortened by the surveyor increasing his pace or by delaying blowing the two blasts until he has left the last station for so many yards. In good country on a calm day a distance of 300 to 400 yards may be maintained with safety, but in enclosed country and in wind it must be lessened considerably. Simple experiment will show the deduction that must be made to correct the measured distance for plotting in a straight line. This method may sound very poor, and is no doubt full of theoretical weaknesses, but it produces practical results, plotting on a scale 1/50,000 with less than 3 per cent. error on joining up traverses.

THROUGH NORTHERN AUSTRALIA: REPORT OF THE TERRY AUSTRALIAN EXPEDITION

Michael Terry

WHEN I was privileged to address the Society, in May 1924, on my journey from east to west across Northern Australia, it seemed to me that a more definite and up-to-date presentation of facts would be of use in the understanding of that part of the Empire. Some are firm in the belief that it is a sandy waste; others seem blinded to any drawbacks it possesses by the vision they see of its future. It was in the hope of putting better information before both these schools of thought that I ventured to draw together the organization necessary for a more ambitious visit. To carry out this work a *personnel* able to examine mineral indications, topographical features, botanical affairs, had to be assembled—able, in short, to return fully informed on the varied aspects of development. As the most convincing argument cannot impress more fairly or vividly than the camera, it was decided to procure both moving and "still" pictures. At the outset it seemed that horse transport would be most suitable—that was, till a make of caterpillar-track motor came before my notice. Having viewed its performance, this type of travel seemed to present every attraction for the task, if only as a parallel to the French feat in crossing the Sahara Desert, in so much as it would be the pioneer journey with this type of English vehicle, and, moreover, the first within the Empire. Also the use of motor transport would increase the popular interest in the expedition and, incidentally, in its object; at the same time the performance of the tractors would determine their value as a factor in development.

Accordingly, on July 21 last year the expedition entrained at Darwin,

Northern Territory, *en route* for Emungalan, the railhead 198 miles to the south. We were equipped with two 1-ton model Guy-Roadless lorries, each with a 10-cwt. trailer. As auxiliary there was an A. J. S. motor cycle and sidecar. Besides general food stores and repair tools there was a wireless receiving set, full mineral prospecting kit, survey and hypsometrical instruments lent by the Society. The party consisted of R. A. Prescott, surveyor, trained in the Society's school; M. Redknap, camera man; A. E. Smitheram, mineralogist; C. F. Syme and E. E. Jolly, drivers; and, last but not least, Lord Apsley, whose interest in settlement possibilities had led to his presence with us. The financial support had been subscribed by a number of private people, and the venture had been further assisted by the Cuthbert Peek Grant awarded to me last year by this Society.

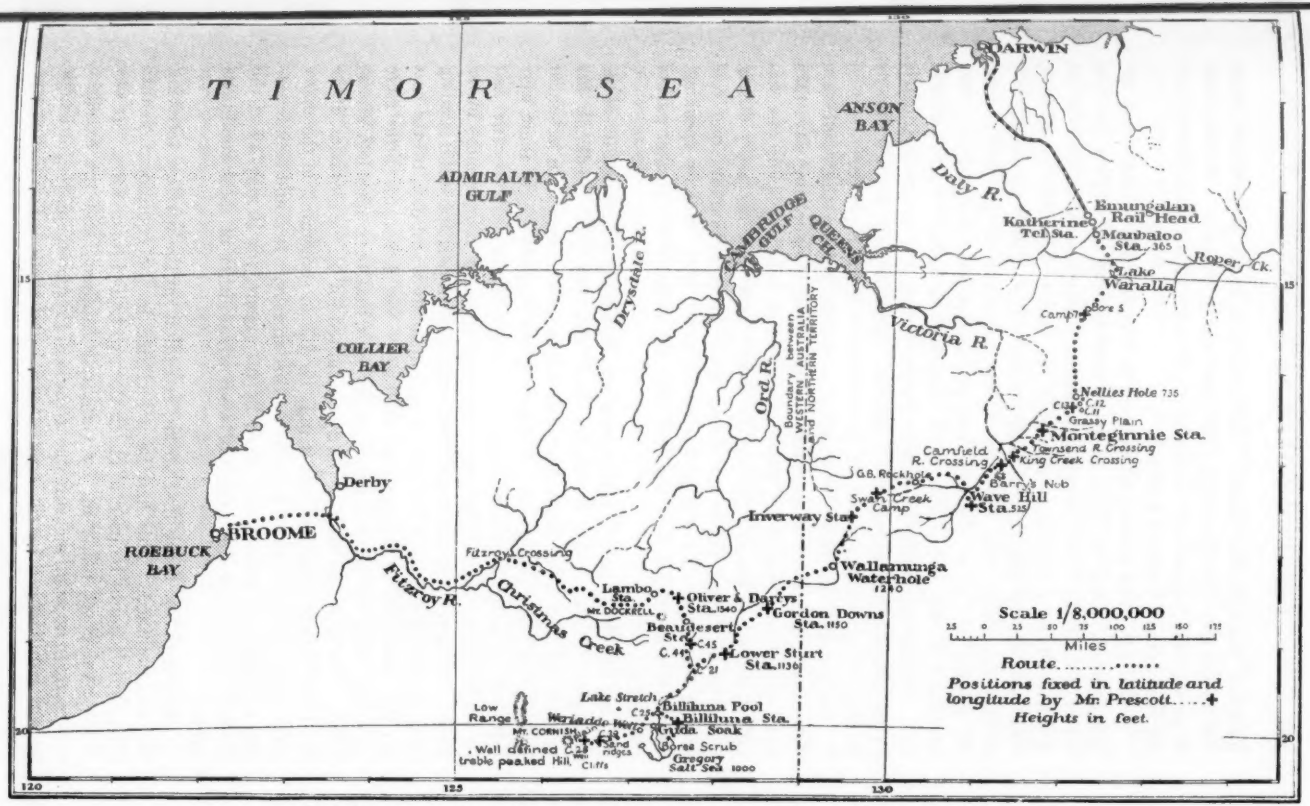
When planning the route during organization in England, it had seemed best to join my previous itinerary at Newcastle Waters, to follow it to Soakage Creek cattle station—now known as Gordon Downs—and to travel down Sturt creek *en route* for the Southesk Tablelands. At that point it was intended to turn westwards, making for Marble Bar by way of Johanna Springs. This proposal embraced every type of country from the well-watered black-soil uplands to the most arid area in the continent. The best portions of Northern Australia and the so-called Dead Heart would be seen; the tractors would be tried under the extremes of easy and difficult overlanding, and their value tested for subsequent use in this class of work or in more ordinary spheres. A fair sample of the North would be brought before our eyes to temper an unduly poor or favourable impression of any one locality.

Before leaving Darwin, the value of shortening the motor route to the upper reaches of the Victoria river was shown to me, so it was determined to take the direct stock route there and abandon the intended and easier way *viâ* Newcastle Waters. In effect this meant going along the base of the triangle formed by Katherine, Newcastle Waters, and Wave Hill, instead of traversing the two sides. Lesser-known country would also be seen, so I felt that the change would be to the good. Accordingly we set out from Manbuloo cattle station, 9 miles down the Katherine river from where it was crossed near the railhead. There we joined the Dry River stock route on July 27. This earliest stage of the journey lay for many miles along the course of the Dry river—hence the name of the route, which has been in use for many years by cattle drovers moving stock to and from the holdings at the head of the Victoria river. More recently it has been busy with cattle going to the meat works at Darwin; they are trucked at Emungalan. At first the country was somewhat sandy, but as progress was made higher lands were found where black soil replaced this. For the initial 150 miles the trees, seldom exceeding a height of 25 to 30 feet, were so thick that one could not see more than a few hundred yards: no idea of adjacent country

might be formed. The impression was that one was travelling in a moving clearing in the bush, for mile after mile the view did not change or extend. Tall coarse grasses covered the ground, sunburnt to a yellowish colour by cloudless days since the last of the rains, *i.e.* April. The annual monsoonal downpour of 25 to 30 inches gives rise to a very heavy growth, averaging from 3 to 4 feet. This screen hid many obstacles over which the cars bumped: fallen tree limbs, stumps, and holes kept the drivers on the *qui vive*. Even so some nasty shocks were received. The low clearance of the motor cycle sidecar soon got her into trouble, for she caught the frame against a stump, springing it badly. The sidecar had to be dismantled and carried on the car; she was ridden solo till camp at eventide beside Lake Wanulla. There, after some experimenting, it was re-fitted on the offside, a change that increased the clearance to over 12 inches, for the whole frame had to be reversed. Thereafter no trouble was experienced on this account.

To keep this route "open" at all seasons, sub-artesian bores are being drilled every 15 to 20 miles, the last, No. 8, being about 135 miles from Manbuloo. Incidentally, this was the farthest point to which a car had previously penetrated.

The absence of emus and kangaroos, except on the rarest occasions, was a source of surprise to every one. In fact, while passing among innumerable anthills for many miles, Redknap, who developed a humorous trait, suggested they must be tombstones to these absent fauna. It seemed one was passing through an enormous graveyard. Had it not been for the profusion of bird-life around the water-holes, the country might have been considered deserted. Their precincts were thronged with whistling duck, teal, galahs, bronze-wing pigeons, cockatoos, corellas, and a plentiful variety of minor bird-life. Wild turkeys were very common, while jabbaroos and brolgas (or native companions) were far from rare. I suppose it would be difficult to find quail more numerous —at times the ground seemed alive with them. They used to scurry away between the tufts of grass or whirr through the air in erratic short flights. Many fell to the gun of Jolly, who became our worthy hunter. Pelican and ibis were there as well, but the turkey was the most welcome addition to the pot: the largest specimen, when dressed, weighed about 14 lbs. They are a very hard bird to stalk on foot; the motorist however has an easy task, for they are intensely inquisitive. The buzzing of the engine seems to fascinate them, for they will walk about the tufts of grass, obviously desperately anxious to fly away, yet held to the spot by the mystery of the sound. Not seldom while the cars continued on the journey the faster-moving motor cycle made excursions over the plains chasing turkeys, to rejoin the others later. Needless to say dingoes were very numerous, and their howls round the camp at night, mingled with the mournful wail of the curlew, were disturbing at first. One day a large native cat, jet black and the size of a well-grown lamb, was seen



Sketch-map to show Mr. Terry's route through North-West Australia

hurrying through the bush. The same evening a snow-white dingo ran almost into the camp while the meal was in progress. It halted not 20 yards away, apparently unable to decide what to do: possibly we were the first human beings it had seen.

Until the rains arrived at the end of October, the weather was decidedly cool. One was glad of every wrap during the night; the first hours of daylight till the sun had gathered strength were bitterly cold as a rule. Once or twice the engines of the motors were difficult to start, and had to run for several minutes before warming up sufficiently to take the load. One morning, being impatient to get under way, the engine of one of the cars was put under load too quickly. She backfired in the carburettor twice and, with a nasty "woof," caught fire. Pyrene was hurriedly sprayed on the flames, which were fortunately extinguished before being able to spread. This incident bears testimony to the low temperatures only 14 degrees south of the Equator.

During the daytime the wind was generally from the south-east. Probably it was more responsible for the fresh invigorating days than any weakness of the sun. During occasional windless spells one was only too glad to discard the woolly jackets that were necessary during the normal days. While admitting that an exceptionally long cool season was experienced, it is worthy of record that, broadly speaking, we were more troubled by the cold than the heat for the greater part of the journey.

One could not help noticing a curious weakness in the quality of the sunlight. Photographic exposures bear this out, and Redknap has assured me that a far larger lens aperture was necessary than in similar latitudes in other countries. At times of the brightest light there were instances of under-exposure, also no member of the party became half so sunburnt as might have been expected after the four months in the bush. In fact, I did not wear a hat at all, except perhaps while bending over some object during the heat of an unusually warm day, till the heat arrived suddenly at the end of October. Yet I became little more sunburnt than the others, although my hair had been bleached almost white. Perhaps this may be partly accounted for by the elevation above sea-level—about 1000 feet—or it may be due to something in the upper atmosphere that acts as an absorber of certain rays. It would be interesting to have this matter examined by an expert, for it may affect the growth of crops or the quality of wool when either of these conditions prevail.

At camp No. 6 the first strong reception on the wireless receiving set was obtained. This had been included in the equipment so that time signals might be used to check the two half-chronometers. It was a three-valve set made up by Gambrell Brothers, and the excellent results are in no small measure due to the skill Prescott displayed, although he was handicapped by the crudest aerial and earth. The former was

a length (100 feet) of insulated copper wire, to the ends of which were attached pieces of rope for suspension to trees, provided of course with two insulators at each end. By using a hammer as slinging weight the ends would be thrown over the forks of two trees sufficiently far apart, the ropes then being hauled taut, hoisting the aerial about 25 feet above the ground. Care was taken that bushes, etc., did not remain beneath the aerial, for by so doing its effective height would have been reduced. When necessary they were cut down and dragged away. The earth was simply a roll of chicken-proof wire netting, about 20 feet long, with the earth wire soldered to it. It was unrolled on the ground and held in contact by stones or a few boughs; water, if available, was thrown over it to aid contact. We tried the experiment of using the steel tracks of the cars as a substitute, but they gave inferior results.

Receptions used to vary considerably with the smallest change in locality; in fact, this was so marked that at one camp the headphones could be laid on the set for use as miniature loud speakers, yet just a few miles away the fainter sounds could be picked up only with great difficulty. Telephony was received very often, a novelty that we fully appreciated; it was amusing to hear the children's hour in the depths of the bush by the light of the camp fire. The station folk, whenever we halted at a homestead, could not do enough for Prescott, for they knew his set held treasures new and untried. At one station an audience of stockmen collected around him after the evening meal—a delighted audience, too, for he was able to let them hear music. Being called away during the performance, he shut off the set for a few minutes. One of the men, becoming impatient for his turn at the headphones, pushed his way to the controls, searched about for a bit, then ceased, puzzled. His answer to the query concerning his discomfiture was that he could not find the handle! A roar of laughter greeted this admission: he thought it was some species of gramophone!

At 163 miles we arrived at the first large natural water-hole, known as Nellies Hole. Although Lake Wunalla had been passed at 49 miles—a name to which it does small credit, for it is not more than 300 yards by 100 yards—the former was considerably larger. Besides the main water there were many arms jutting out, making the whole resemble a huge human hand. After nightfall many cattle came in from the plains for their evening drink. They seemed disturbed by our presence, and kept charging through the water channels, raising no small row and sometimes so close that it seemed they might blunder through the camp. Slightly to the north of this place we had crossed the divide separating the waters that flow into the Armstrong river and latterly to the sea down the Victoria river, from those that fill the Dry river, which joins the Katherine near Manbuloo station, in its turn emptying into the Daly river before reaching the sea to the north of the Victoria.

About this time the country began to change. The perpetual timber,

with its carpet of coarse grasses, gave place to occasional vistas of open plain covered with a sweeter growth of Mitchell grass. As we were travelling along the rim of the river-basin it was not to be expected that the huge open plains, for which the Victoria river is famed, would shortly be unfolded. Our route lay along the foothills and broken country bordering the great Barclay Tableland. The flat black-soil lands, bare of timber except along the watercourses, lay to the west, and did not occasionally come into distant view until we had passed Montejinnie. Thus it surprised me that any open plain should be found till entering the basin proper. In fact, while traversing the upper reaches of Pear Tree creek we came upon a most unexpected series of grassy downs alternating with timbered areas. On one occasion it was possible to see many miles to the eastward—right to the actual edge of the Barclay Tableland. Rising in an apparently abrupt wall some 200 feet high, the "jump-up" marking its edge stretched across the eastern horizon as far as vision permitted. At that period we were somewhat off the stock-route (having failed to adhere to directions correctly while setting out from Nellies Hole), and so we found ourselves drawn away to the upper reaches of Pear Tree creek. Rather than double back on our tracks, I decided to follow down the course of the creek, but having done so for about 12 miles, and finding rough country ahead, we left the creek and, travelling nearly south-west, rejoined the stock route 12 miles north of the Armstrong river. This unintended *détour* had been most illuminating, for the presence of good pastoral land had not been expected before passing the Armstrong river; no mention had been made of such, nor did the map suggest its presence.

After running along the eastern bank of Fig Tree creek, into which Pear Tree creek flows to the north of the locality where we rejoined the stock route, we intersected my itinerary of 1923 at Top Spring, the permanent water farthest up the bed of the Armstrong. About a mile before crossing this river Fig Tree creek had curved away to the westward, and from the crossing one could see where it converged less than half a mile downstream. It was interesting to find, just over the river, a signboard, exceptionally well printed, marking the spot where the ways to Emungalan and Newcastle Waters parted. Since my visit two years previously a track has been blazed from the latter place to Montejinnie; creek crossings have been made, *détours* found to avoid the worst stones or limestone ridges, and a straight though steep approach formed the "jump-up" to the Barclay Tableland. Consequently there was no hesitation about finding Montejinnie homestead, where the expedition arrived at sundown on August 12.

The garden, which had so interested me on an earlier occasion, was still flourishing. Cauliflowers, tomatoes, turnips, sweet potatoes, beetroot, and other kinds were growing with real success. Also the man in charge of this garden assured me that cauliflowers have grown till

Crossing the Katherine River

Country around first section of Dry River stock-route

Limestone country near Curranjacky Creek

Water-hole, Montejinnie Creek

4 feet high and measuring 2 feet across. He has obtained cabbages weighing as much as 22 lbs. and sweet potatoes up to 6 or 7 lbs. Two crops of the last are grown annually—in March and September. Ventures in tropical products have produced a fine grove of bananas with picturesque paw-paw trees grouped alongside, as well as custard-apples and Cape gooseberries. This success has prompted a trial of cotton. Native cotton trees were in evidence from the start by rail at Darwin, and at intervals until the Townshend river had been left behind. Typical specimens were 3 or 4 feet high, but one was seen about 15 feet high. The bush reminds one strongly of franjipani, with which every traveller in the Orient must be familiar. The flower is a bright yellow; the pods, light green in colour, were the size of ducks' eggs, and brought passion-fruit to mind.

We camped several days at Montejinnie, loth to leave the pleasant environment that welcomed us. The hospitable man in charge—living alone—was more than generous with his garden supplies. The water-hole in the creek became a daily source of aquatic enjoyment; it was filled by a running stream of crystal-clear water from springs in the limestone hills to the east. And the whole countryside, with tall green timber bordering the waterway, made one feel that such spots as these should be fenced off and left unharmed while the settler passes by, disfiguring nature in the quest of production. It was the most pleasant camp on the journey.

Soon after moving on again we crossed two other running creeks, named Lonely and Curranjacky, between which progress was very slow, owing to the beds of limestone across the way. Great slabs lay upon the ground, clanking as the cars moved over them; others were embedded upright in the earth. The sharp protruding edges had to be avoided or broken away with the head of an axe. While thus engaged it was noticed that black markings were impressed on the divisional planes of the broken slabs. Most of them resembled fernlike structures, while others looked like miniature reproductions of the cloud of smoke arising from a bursting shell. Hoping that a species of fossil had been accidentally discovered, a number of specimens were collected, but when examined at Perth by the Geological Department of Western Australia, were reported to be "dendritic markings" due to the introduction of a film of black oxide of manganese. Soon after passing Curranjacky creek, in a large limestone outcrop we noticed what looked like short lengths of tree-trunk fossilized in the rock. Surrounded by the light grey limestone, one saw sections of oval and round intrusions with a thin whitish "bark," encasing dark brown rock, marked with coarse lines resembling the base section of a tree-trunk. It has not been possible to make sure what these may be, but they look like concretions.

Here I again noticed a formation of hills which, should the need for water conservation on a large scale arise, might permit a big reservoir

to be formed. Two series of hills, about 5 miles apart in the east, sweep in arcs towards each other till separated only by a few hundred yards in the west. A fair-sized creek, draining the area, runs through the gap. It seems to me that a dam could be erected without great cost to hold back these waters for irrigating the adjacent plains. The rainfall is about 20 inches annually.

While at Montejinnie a deposit of natural cement was shown to me. It had been put to several uses, including the formation of a fireplace at the homestead. Also, close by Lonely creek, we found specimens of rainstone—clear pieces of mica, embedded in rock, which the aboriginals chip out and use as charms. Whenever rain is likely to come the rainstone is produced by the medicine man, who, after suitable incantations, consults his magic stone and predicts rain. To the credulous native mind this glimpse into the future is truly miraculous; to an impartial observer it is a clever use of nature's warnings. Of course, should the rain not fall, the stone is a bad one; the soothsayer is never at fault. Near by I was told by Jolly that he had seen, in the creek, a tortoise which he judged to be 1 foot long and 9 inches broad.

At 261 miles we crossed the Townshend river. Thereafter areas of very trying stones, known locally as "basalt boulders," were encountered. Few projected more than 9 or 10 inches above the soil, but occasionally ones as large as a 70-lb. bag of sugar were seen—and felt. The Guy cars, although equipped with creepers, could only be driven at walking pace, and the poor motor cyclist suffered severe discomfort. These stones were at their worst along the stock route, and many times far better travelling was achieved by detouring some considerable distance to one side or the other. When the red-loam flats along watercourses could be reached, excellent surface was the reward. Examination made it apparent that the ground was mainly a bed of stones, figuratively speaking, cemented together by soil.

At this period of the journey the country commenced to alter. Open downs made their appearance, and trees became fewer and fewer till, apart from isolated groups, the only timber seen was the winding serpents of thick green gum trees denoting the courses of the creeks. The most common varieties were woolibut, bloodwood, mimosa, coolibah, pear tree, bean tree, pandanus and screw palms, and desert gum. Many miles of silver-leafed box were passed through before Montejinnie, and a species strongly resembling gutta-percha was often in evidence. Hard woods, such as bull-waddi and lancewood, were not uncommon, giving place at times to swamp tee-tree and paper bark.

Having arrived at a point rather to the north and west of Barry's Knob, we found the stones on the stock route even worse than ever. As we were converging towards the team road along the Victoria river, which lay not more than 8 miles to the west, I decided to make for it

across country rather than struggle ahead to make junction at Reny creek. Accordingly we followed up the banks of a creek on our right, and at the head of a small ravine it was possible to get on to the crest of a stony ridge by taking the cars up its steep side. They were equipped with dual gear boxes by which an exceedingly low gear ratio could be brought into use. With engines revolving at a considerable speed the cars crept slowly up the grade. Sometimes the tracks would slip a little when perched on protruding stones, still they never faltered. Having negotiated some very stony and broken country, we arrived at the crest of the divide separating us from the waters running into the Victoria river direct: we had previously been in the area drained by a tributary, the Camfield river. Apart from Barry's Knob lying behind us, we were on the highest land in the neighbourhood. It was possible to see a huge distance to the west. Blue hills in the dimmest distance—no doubt 30 to 40 miles away—formed the background to a vista of yellow-tinted plain that appeared from beneath the foothills at our feet. To the north a glimpse, between hills near to, revealed unbroken plain to the haziest horizon. One felt the coast could not be far away, where the curvature of the earth hid further miles of this view. In reality I suppose some 70 miles was the limit of sight.

Rising ground close by a winding creek which rapidly gathered volume—indicated by the increasing timber along its banks—gave the clue for further travelling. Along its course, once the hills had been quitted, we found excellent red-loam flats that eventually led us to the main road next day. We were then 32 miles from Wave Hill cattle station, where the expedition arrived on August 21.

At this station we stopped for several days to increase stores, overhaul cars, and secure moving pictures. It was sad to see the damage wrought by the flood shortly after I passed in 1923. The river had risen about 40 feet, sweeping over the roofs of the buildings, either destroying them or making them assume a precarious slant. The garden had been obliterated, and much equipment, including all personal belongings, had disappeared. A new homestead is now being erected (it may now be completed) 8 miles distant. A bore has been put down for the new water supply, and a large transmitting and receiving wireless station erected on the new site. I think the latter has been already put into service. Apart from the change of diet the stay at Wave Hill will be remembered for the bitterly cold weather. The wind had been northerly, but it soon swung round to the south-east, making woolly jackets and even coats advisable all day, and until the sun gained strength one could not call the weather pleasant.

On setting out again I found considerable improvement over the conditions of two years earlier. Where there had only been the most indefinite signs to guide the traveller, now he was blessed with a clear track. A fire-plough had been taken over the route, and

though it had not been able to clear away the stones during the first 30 miles, once past them one could move along in comfort and a fair speed. It was eventually learnt that a fire-plough track had been made right through to Flora Valley station, close to Hall's Creek. This method of road making is not common in the Northern Territory, but is much used in Queensland. There the plough clears a path through the grass so as to check bush fires, its value to facilitate transport being quite secondary. But so huge are the areas in the Territory that fires cannot be held in check, and so the plough is only used as a road maker. The principle is to drag a V-shaped metal cutter over the ground, so that it may perform a kind of planing action. The tufts of grass are cut off, stones of small size pushed away, and the general unevenness of the soil smoothed out—at least that is the theory, but the result must vary with the efficiency of the plough. The most primitive type is a rough equilateral triangle of logs, with two sides faced with steel cutters. Drawn by a team of animals and weighted down to keep it in good contact, this works well. Wherever possible an all-metal plough is used. The one I saw was a four-wheeled machine supporting two long steel cutters between the axles. These were placed at an angle of about 30 degrees across the path of the machine, the depth of ploughing being controlled by screw adjustment. A team of horses can clear 10 miles a day, leaving a path about 12 feet wide.

After leaving the Victoria river a steady gentle upward grade was found. The barometer dropped regularly, and that night at camp, 13 miles farther on, it showed we were 250 feet above the homestead. For the next 20 miles open downs were crossed, till in the neighbourhood of Giles creek the sandy soil of desert country was entered. Here the dust was most unpleasant. Sometimes it would be caught by the following wind and carried in a dense cloud ahead of the cars: one would lose sight of the radiator, only 2 or 3 feet away, and it would be necessary to halt while the yellow cloud drifted along the track and dispersed.

The name "desert country" has been given to this sandy land, because it does not hold water on the surface. On the black-soil downs the rain collects in any depression and remains there as long as wind and sun permit, but in the desert country the porous nature of the ground allows it to collect subterraneously. The curious feature is that this desert carries all kinds of tree and scrub life, such as desert gum, kurrajong, supplejack, with beefwood, bean tree, and cork wood along the watercourses. The grass is generally spinifex of various species, and, needless to say, anthills cover the ground. They range from clusters of small ones 2 feet high to, in some parts, monsters 32 feet high. We saw one at least 15 feet high. This "desert" country forms a valuable adjunct to the downs, for it provides shade for the stock and, being higher than the surrounding land, a refuge during the floods in the wet. Also the feed it carries makes an excellent reserve during a dry spell.

Some distance on the way we joined Swan creek. Here a most pleasant camp, rivalling Montejinnie, was made for a couple of days. Beneath the shade of a thick grove of pandanus, surmounted by the wide green foliage of three enormous native fig trees, we drove the cars. Prescott was kept busy with survey matters, and Smitheram made a rough survey of the local formations. His report was that the " country " had a north-west by south-east trend, and was composed of long broken ridges covered with basalt overlying ironstone, jasper, opalized rock, and sandstone. In one place he had seen slate and a little limestone, but there was very little quartz and no mineral showing, except traces of copper. A specimen that Smitheram collected has been examined and is classed as a dark brown amygdaloidal melaphyre, evidently part of the great basaltic lava-flows typical of this part of Australia.

Twenty miles from this camp we crossed the divide separating the inland waters from those joining Stirling creek and latterly the Ord river. While doing so a theory put to me by a bushman, whose knowledge of the Victoria river country is acknowledged, came to mind. He suggested that the Antrim Plateau, on to which we had mounted, might be connected with the Barclay Tableland by land of the same elevation. He had traced the " jump-up " on the Murranji track for a long way to the south, and had found evidence that it worked round more westerly. He had not been far enough to test this supposition, but his knowledge of the Antrim Plateau has made him believe that the edge of the basin of the Victoria is marked all round its head by a continuous " jump-up." The topographical possibility may be worth investigating, though I have heard this information contradicted.

At Inverway station we met another man who gave an interesting account of an inland lake he discovered in April 1921. While travelling from this station to Alice Springs in Central Australia he had come across a sheet of water measuring 12 miles by 4. This lake, which he called Warburton's Swamp, contained fresh water to a maximum depth of 30 feet. There was game of every description on and around its waters, but when he revisited the locality in February 1925 he found the lake dry—it had lasted only four years. According to his calculation this swamp is some 250 miles west of the Overland Telegraph line, measured from Bainie Well between the telegraph stations at Barrow creek and Tennant creek. Later I also gathered particulars concerning another lake discovered in March 1907 by a prospecting party, who travelled about 70 or 80 miles south-east of Tanami and round a lake 15 to 17 miles long and 7 to 10 miles wide. It was dry at the edges but there appeared to be water in the centre, or possibly it may have been mirage, for scarcity of provisions prevented further examination. On the far or southern side there were " big blue mountains," with hills to the east. Those familiar with inland Australia do not need to be told that distant blue mountains, seeming to be thousands of feet high, will

be usually found when reached to be only several hundred feet high. This is largely due to distortion by mirage. Anyhow, it is interesting to hear of any hills at all in the interior, for it helps to dispel the belief in its unbroken flatness, and may explain the cold south winds.

I also learnt of a third find made by another party late in 1924. According to the meagre details available, these latter people had come upon another catchment whose location could not be far distant from that near Tanami. Their information was that water was up to the saddle-flaps, and so great was the interest taken in the report that a return was arranged. Upon reaching the site some months later, the lake was found to be nearly dry and the water brackish. From what it has been possible to learn, my own opinion is these last-mentioned finds are the original and the latest discovery of the same thing. Apart from the grazing possibilities suggested by these waters, the recording of them is of value as a corrective to the belief in the rainlessness of the "dead heart." Before leaving Inverway station I inquired about boring for water, and was told that a bore had been put down to a depth of 111 feet, yielding a good supply although somewhat hard. This is the sole attempt yet made on this corner of the plateau. The rainfall is from 16 to 17 inches annually, with a maximum recorded fall of 32 inches in 1907. There are plenty of frosts in July; there were five in 1925.

Almost immediately after leaving the homestead we joined Sturt creek, down which we travelled to Wallamunga water-hole. During this stage one passed through some of the best pastoral country on the entire journey: short sweet mitchell and flinders grasses growing on black-soil plains stretching westwards as far as the eye could reach. On the eastern side of the Sturt higher land and typical "desert country" were at first seen, but as Wallamunga was neared the country opened out into a vast yellow plain, treeless and immense. At this water-hole, where the best wireless reception on the trip was obtained, the fire-plough track led us to the south-west away from the creek. The West Australian border was crossed at trig. post Number 13, and the Sturt rejoined shortly afterwards. When somewhat past Mount Wittenoom, at a water-hole called Sweet Water, the track bore away direct to Gordon Downs homestead, where the cars arrived on September 5. I had reached there the day previous, having hurried ahead on the A. J. S. motor cycle, which we had christened *Gelaben*, meaning "black cockatoo." At this station we stopped some time to secure more stores from Hall's Creek township, 100 miles nearer the coast, and also to fit up dual radiators on the cars. These had been sent from England *viâ* Derby after I had departed, and were to be an extra safeguard against overheating in the sand plains ahead.

Much improvement had taken place since my previous visit. Firstly, the telegraph running from Derby to Wyndham *viâ* Hall's Creek had been extended to within 30 miles of Gordon Downs, and was soon to

reach the homestead. Secondly, several bores had been put down, yielding good supplies at depths from 300 to 500 feet. I learnt that it was an understanding that should a supply not be reached at 500 feet then another site must be tried. I did not hear of this alternative being necessary.

As we are about to leave the properties owned by the Northern Agency, Limited, it is fitting that I should thank them for the great kindness and hospitality extended to my party. They were most helpful in numerous ways, and their conveniences, such as fire-plough tracks, telephones, and bores, were of considerable help to us as well as to others moving in the district. They had also done us service in assembling natives at the Lower Sturt station for a corroboree to be filmed, but unfortunately these uncertain children of nature had been seized by the *Wanderlust* two days before we arrived. So their efforts were of no avail.

Hoping to gather more together further afield, at the last homestead before the open country, we hurried down the Sturt to Billiluna station close by Gregory's Inland Sea. There we arrived on September 28, and several days later, after messengers had been sent into the bush, quite a good number came in.

On the way to Billiluna some high sandhills had to be crossed ; these were good testing grounds for the tractors, and made it possible, for the first time, to judge with real accuracy our chances of penetrating the arduous country ahead.

The first car to undergo the test was *Gwalowa*,* with Syme at the wheel. With engine buzzing hard and the special low gear in use, she crept slowly to the crest. The front wheels and those of the trailer were not turning ; they were being simply forced through the loose wind-driven sand as though each had a brake full on. With these wheels half buried in sand *Gwalowa* continued to force her way up the steep slope till close to the crest. The tracks hardly buried at all, but so much loose red sand piled up in front of the wheels that, with engine beating rhythmically, she was gradually brought to a standstill. Then, such was the power, the tracks commenced to slip round, tearing the sand from under them, and heaping it behind. Another foot or two would have allowed the front wheels to drop, rapidly bringing the car level again. As it was *Gwalowa* stopped at such an angle that one could only plod around her with difficulty. With her nose cocked in the air she seemed a fixture, to disappear in course of time beneath the drifting sand.

Having anticipated this possibility, 120 feet of wire rope had been included among the kit. We detached the trailer, whereupon she moved on again. Once clear of the crest, and thus on a steeper downward

* The cars were named *Maililma*, meaning " centipede," and *Gwalowa*, meaning " caterpillar " in the dialect of the Daly river blacks

grade, she hauled her trailer over, and with her assistance *Maililma*, complete with trailer, had no difficulty in following her track to the level ground beyond. The other sandhills were not so severe, and we could cross them without quitting the cars. These hills ran north and south, and the western face was considerably steeper: when re-crossing them the trailers did not have to be taken off.

While at Billiluna we made a brief reconnaissance of Gregory's Inland Sea, his furthest point in March 1856. Having traced the Victoria river to its source, he had followed down Sturt creek to its terminus—the sea to which he has given his name. When we viewed it there was no water in it, a state of things not heard of for at least ten years. This information was learnt from the blacks, who, like all primitive peoples, are very indefinite about time. Generally it is thronged with bird-life: all we saw was a glistening white expanse of drying salt-bog. The air was pungent with its vapours; one felt that strong sea air was being inhaled.

In the dim distance a dark line across the horizon denoted the farther limit of the sea—the boree scrub lining its shores. *Maililma* was driven a short way on to the bed of the sea, but with great caution, lest there might be only a thin crust above a quagmire of bog. Prescott took a barometrical reading, and Redknap motion pictures of the first vehicle to reach the locality or rest on the sea itself. In normal seasons the rainfall is sufficient to make Sturt creek flow, replenishing the sea yearly. However, we arrived during the driest season on record, and no water had come down the creek for three years. This clear indication of drought made one wonder how we should fare in regard to water matters in the more arid country ahead.

Boree being the most common tree in that part, it should be described. The trees grow in sandy soil to an average height of 30 feet, and so close together that there is just sufficient room to walk between them. It has a thin dark curly bark and a very tough wood. The trunks are straight, not more than a foot in diameter at the base, usually much less, there being one main trunk or sometimes two small ones separating at the surface of the ground. In either instance there are no branches till well up the tree; then a number shoot out bearing long dark green petal-like leaves. The lack of foliage below produces a notably bunchy top, well rounded. With a stretch of imagination one might be looking at an overgrown toad-stool with an extraordinarily long stem.

After setting out from Billiluna station, where our most useful scout, the motor cycle, had to be abandoned on account of the sand, we made for Sturt creek again. At Billiluna pool we worked away south-westerly for C. 25—a blazed tree marking a water-hole located by Mr. Canning, who created the stock route named after him in 1906.

The route was opened up with the idea of permitting the stockmen of the Kimberleys to take their beasts direct to the markets on the southern

Dry bed of Gregory's Inland Sea near Billiluna

Looking west from edge of Barclay Tableland, Murranji track

Crossing a sandhill near Southesk Tableland

Looking west from Divide near Ruby Plains station

goldfields, around such famous towns as Kalgoorlie and Coolgardie. Much money was spent in the construction of wells, equipped with windlasses and troughing, every 15 or 20 miles. Water was always found at shallow depths, often by enlarging existing native wells or by bores at suitable sites. In some instances it was obtained a few feet below the surface; seldom was it necessary to go down more than 30 feet. This speaks a great deal for the subterranean supplies, and I have been assured by reliable authorities that no part of Australia is better blessed with water—just beneath the ground. Also two wells sunk at Billiluna have yielded good supplies, one at 29 feet and the other at 40 feet. It is rather noticeable, as one travels inland and approaches the drier areas, that water can be obtained at constantly lessening depths.

One party, moving in three sections, took cattle down the route in 1911, but since that time one can number on one's hand the men who have made use of it. These have taken camels up and down, but no cattle have been over the ground since 1911. And yet those that did go then arrived in good condition after crossing the "desert," and had lost the ticks that had pestered them before the journey. Unfortunately the first party was attacked by natives and the two white men speared, which probably had something to do with the disuse of the route.

Nowadays most of the wells have fallen in, buckets lie at the bottom, ropes have gone, troughs are rusted away, and many a native camp hides trophies from the route. The combined efforts of the black fellow and nature have resulted in the virtual destruction of the Canning Stock-route.

Hard by C. 25 we encountered very soft white sand amongst thick scrub, mostly tee tree and paper bark. This caused some delay, for the sand made steering most difficult. The front wheels used to bite deeply into it, swinging on to full lock at the least provocation, while the loose sand would heap up in front nearly to the axle. Straightening the wheels could only be effected by going in reverse for a short distance, and great care had to be exercised to prevent the trailer swinging round at right angles to the car. Should that occur before the wheels had been straightened, one was unable to move in either direction: the trailer had to be detached or the sand dug away from the wheels.

Three and a half miles from C. 25 the dry bed of a fresh-water swamp was encountered. Along its level white surface, hard as concrete, we made rapid progress till, after 4 miles, the southern limit was reached. After crossing a neck of very soft whitish sand, thickly carpeted with spinifex amongst boree, another swamp was found, but although much softer it was comparatively easy to cross. The black, Wallaby by name, who was piloting us, had some difficulty in locating Weriaddo well, our objective. When it was eventually found one was almost surprised that it had been found at all. Low sand-ridges running east and west hid every sign of its presence, there were no large trees to mark the spot,

nor could the woodwork of the windlass be seen till the actual "valley" in which the well was placed had been entered. We had been warned the water would not be too good, and in fact it was so bitter that drinking was out of the question; nor could it be used for washing, as soap would not lather. There was plenty of gypsum on the dump from the shaft, no doubt accounting for the impurity of the water. The supply, 13 feet down, was so scanty that it soon bailed dry, and on revisiting the well we found that a bush fire had destroyed the woodwork so that it can now be disregarded as a supply at all.

Soon after moving from Weriaddo well the last of the boree was left behind, the first of the desert oaks seen, and the region of the sand-ridges entered. Running in parallel lines, on a bearing of 92°, 300 or 400 yards apart, of even height and straight as a die, these ridges presented a most curious sight. All sorts of metaphors sprang to mind. It seemed that a giant rake had been pulled over the land. With their crests gleaming red in the sunlight and their slopes green with spinifex and scrub, they were not without a certain austere beauty of colour—when seen for the first time. However, when occasion to cross them arose one quickly forgot this sole asset they possessed. Their bare wind-driven tops formed barriers where one could only plod about with difficulty and where every ounce of power in the cars was needed to effect a passage. As you stood on the crest an unbroken succession of these ridges was visible to the north and south. Line upon line they stretched to the horizon,—level and uninteresting. Occasionally isolated hills broke the monotony, and sometines a belt of timber, running up the side of a ridge, across its crest, through the valley beyond, over the next and many others, helped somewhat to add a note of colour and change to the view.

The prevailing wind in this locality is from the east (at times also from the west), and as these ridges lie approximately east and west it is hard to associate their origin with the action of the wind. Signs of sandstone were noticed in them, and as they do not appear to be moving one may be permitted to wonder whether the sea has not played some part in their formation.

The spinifex grass to which reference has been made grows in circular tufts from 1 foot to 7 or 8 in diameter, the height rarely exceeding 2 or 3 feet. Its colour varies from light green to dirty grey, being governed by its age, which in its turn is determined by the frequency of the bush fires. The grass is thin, hard, and wiry, except when a new growth springs up after a fire. The top of each tuft resembles the back of a porcupine, being a mass of thornlike projections—the sun-dried ends of the grass. A number of long thin shoots stand up from the centre of the tuft, possibly 2 or 3 feet above the actual tuft; these are the seed-carriers. When the spinifex is young it is accepted as stock feed, and at all times the seed when collected is most excellent for fattening horses.

There are three chief varieties known to me: soft spinifex grows in such small tufts that it makes a moderately even carpet over the ground; ordinary spinifex grows on a hard cone-like mound, less than a foot high, spreading around it and hiding its presence; the largest kind, called buck spinifex or porcupine grass, grows in immense circular mounds but does not contain an earthy projection. The seed of the last is quite on a par with corn as a fodder. One can drive a vehicle through buck spinifex without a jolt worth mentioning, but over ordinary spinifex walking pace may not be exceeded if springs are to be left intact. Whatever the vehicle, be it caterpillar motor car or dray, it has to bump, jolt, and jar over a maze of back-breaking excrescences that are far worse than any potholed road in France or cobbled pavé of Belgium.

One does not find this spinifex alone, for the country it favours is, so far as I know, the home of top feed. This term refers to the edible bushes of every variety that have now proved to be excellent stock feed where it is possible to stock the land lightly. They vary in height from a few inches to 7 or 8 feet. There must be several hundred varieties known to botanists, some peculiar to isolated localities. There is scrub mulga, lavender bush, supplejack, milkwood, salt bush, every kind of bean bush, and a host of others. Wattle or mimosa grows freely in this class of country, but the stock do not eat this. So when one realizes that the interior of Australia is covered with grass of a variety peculiar to it and is strewn with all kinds of scrub and bush that have been proved to be supporters of animal life, one may be permitted to wonder whether the label of "great sandy desert" is quite a true definition. So far as we know, there is an entire absence of open sandy waste without vegetation which is the typical desert of the popular mind. Although not wishing to suggest that the Australian Inland is not arid, I do think it is unfairly prejudiced by the present name allotted to it. Should human beings, without an animal like the camel to transport them, be able to live in a desert? Then how is it that the aboriginals manage to exist—meanly, it is granted—throughout the interior? It is well known that their native wells and soaks dot the country, and that a simple boring apparatus will reach water in a comparatively few feet. Surely the Australian desert has an adjunct, which, although scanty, should not be there at all if in a true desert. In fairness, then, to the interior, and more accurately to inform the pioneer, might not a more suitable name be found? The term "sand plain" comes to my mind. It still conveys the impression of aridity, but there is a moderation in what it implies which, to me, seems very desirable. The type is not prairie, nor downs, nor veldt, nor steppe, nor desert, nor wilderness. Then what is a truer definition than "sand plain"?

To return to the expedition. The desert oaks seen after Weriaddo well marked the southern edge of an extensive forest reported by the Hon. David Carnegie during his famous pioneer journey from the Southern

Goldfields to Hall's Creek and return. From information received it seems that this forest stretches from the level of Weriaddo to close upon Wolf creek in the north; its eastern boundary is 6 miles west of Lake Stretch, its western about 25 miles farther west. If the trees are consistently thick throughout the area outlined, this may be a valuable forest reserve when development puts a commercial value on the wood. At present the distance from port robs it of any marketable value.

These "casuarina" trees grow to 30 or 35 feet, and are easily distinguished by the black appearance imparted by the thick black bark, which looks not unlike overcooked beef. The long thin green petal-like leaves grow scantily from the upper branches. Logs measuring 10 by 10 inches in section and 16 feet long can be cut. The wood is very hard to work, and unless it comes to the carpenter directly it is felled, or is specially wetted, most tools have no effect on it. It is about the same weight as "jarrah," and a sample sent to Perth has been most favourably commented upon. However, perhaps its greatest merit is that it is proof against the ravages of the white ant.

In a rocky gorge to the east of No. 50 well, which had fallen in, we found a rock hole containing sufficient water to supply a dozen horses. Near the head of the gorge we found a narrow cleft in the wall, at the end of which, tucked away at the foot of the facing rock, there was a hole full of water. It appeared to be excellent, but had a light green colour and became frothy when poured. This sign of impurity was brought to a test when the party suffered from diarrhœa after drinking it. This may however have been due to contamination by birds watering there, or the water may have become stale through lying poorly ventilated in the closely confined cavity. It was the only natural water found between Well 48 and C. 25, a distance of 60 miles, the intervening wells having fallen in.

On October 11 we arrived at the edge of the Southesk Tablelands. The approach from the east is a gentle rise terminating in a 300-foot sheer drop at the edge of the escarpment. The term "tableland" seems rather misleading; a section would show them as a right-angled triangle with a long hypotenuse. Their horizontal crest is less than a mile across.

Some delay occurred before a way to descend could be found. Eventually, about 2 miles to the north of Twin Heads, a steep valley containing a creek gave the desired opportunity. Apart from a final drop of 20 feet no great difficulty was presented, and that afternoon we arrived at No. 48 well. It was most lucky that this had not fallen in, for our water stocks were not of the largest. We were relying on supplies from Godfrey's Tank or Kunningarra; these are two large rock holes at the heads of "bays" in the face of the Tablelands. When these were found not an atom of water was there, and yet all information had led one to rely on them as permanent. This discovery at once made it clear that an exceptionally dry season was in progress, and as information

from natives taught us that nearly all the blacks had quitted the locality for better-watered areas, we decided that undue risks would attend further examination of the region. So after a short journey to visit Mount Cornish, we profited by the wisdom of the regular inhabitants and made for less arid country.

Mount Cornish lies about 8 miles to the west of Twin Heads, and is the most notable hill on that horizon. On arrival it was found to be less than 200 feet high. It seems we were the first white men to reach the spot, and a cairn was erected to mark the event. The most interesting feature in the landscape was a range of hills across the distant western horizon. Running apparently north and south there was a string of seven flat-topped hills, distant about 30 miles. Prescott took cross bearings with prismatic compass on a curious hill, at the southern end, having three peaks. This range is not shown on any official publication that can be found, therefore it may be an addition to the map of the region. Still, one must be guarded in making any claim, for the interior of Australia has been criss-crossed by the trails of bushmen who have wandered without leaving official record.

From Mount Cornish we travelled back along our tracks to the Sturt, following it up to the junction of Wolf creek. Along its course we turned westwards once more, still in roadless country, till a team road was eventually joined at Beaudesert station. There the need to take a compass-bearing finally disappeared, and progress was much swifter. After passing Ruby Plains station we joined my itinerary of 1923 close to Mount Barrett, where the main track to the coast was intersected. With the exception of a side trip to visit Mount Dockerell in search of gold, the travelling was commonplace. At Fitzroy Crossing, in view of the excellent tracks ahead, the cars were converted to wheels, with consequent increase in speed. Thirty miles from Derby we crossed the Fitzroy again and joined the track to Broome, where the party arrived on November 22.

In the course of four months we had traversed some 2000 miles in the heart of Northern Australia, and had seen every type of country. The cars were shipped to Perth by the same boat that took the rest of the party. I flew south by the weekly aeroplane to make arrangements.

As I conclude I would like to pay tribute to the men who accompanied me. Each did his utmost at the task allotted him, and by sticking to the game, often under unpleasant circumstances, showed that spirit of determination which alone has made such expeditions possible. And, finally, it would be amiss to exclude the mechanical transport, that did not fail us on the whole long journey, from this expression of appreciation.

RECORD OF POSITIONS FIXED BY ASTRONOMICAL OBSERVATIONS IN CONJUNCTION WITH WIRELESS AND OF HEIGHTS ABOVE SEA-LEVEL

R. A. Prescott

IT would be difficult to imagine better conditions for astronomical work than those which exist in the Northern Territory and Western Australia during the winter and early spring. The nights are beautifully clear and very small stars can be picked out with the telescope, while there are no insects to distract the observer.

The instruments which the Royal Geographical Society kindly lent to us were as follows: one 6-inch theodolite with micrometers in two cases; one prismatic compass; one aneroid barometer reading up to 10,000 feet; one boiling-point apparatus; one 6-inch sextant and artificial horizon; two half-chronometer watches.

The wireless receiver we had was a three-valve set, with one stage of high frequency, one detector, and one stage of low frequency amplification. It was made by Messrs. Gambrell & Sons, 76, Victoria Street, who arranged it most compactly with spare batteries, in a shut-up box with no external parts to be injured.

I used rubber-insulated wire for an aerial rigged between two trees, by cords slung over branches. The earth consisted of 20 feet of ordinary wire netting, with wire soldered to it, spread out on the ground with sticks and stones thrown on to keep it flat. The receiver was a great success, and I picked up the time signals on most nights from Perth and Adelaide at distances up to 1800 miles, but nothing could be heard in the daytime.

Dry batteries were used throughout—two Hellesen $1\frac{1}{2}$ cells for the low-tension supply, and the spares were never used. Since I got back to England I have had well over one hundred hours of work from these two spare batteries, which were nearly nine months in the tropics, and I think that they would do excellently for lighting a theodolite.

The observations were nearly all taken at night, and whenever possible results are by means of pairs of E. and W. or N. and S. stars. Stars were observed at an altitude of from 30° to 55°. The shimmer of the atmosphere made it very difficult to observe a point accurately during the day.

The greatest difference between latitudes by N. and S. stars was 5″, while the difference between longitudes by E. and W. stars was 15″, except in the case of "Swan River Water-holes," which was fixed by a.m. and p.m. observations of the sun, which differed by 50″.

I observed for azimuth at intervals along the route, and the results approximated to the figures on the charts, and my last observation for azimuth near Godfrey's Tank gave a mean result, from E. and W. stars, of 2° 34′ 4″ E., the two observations differing by 17″.

My last observation for longitude on our journey westward was at Well C. 28 near Godfrey's Tank, which I made almost exactly 126° 31′ E., which is further west of the position usually marked on maps. Mr. Canning's position is about 126° 37′ E., while Mr. Carnegie, who discovered Godfrey's Tank (2 miles east from the well), gives that position by dead reckoning as 126° 25′ E. Our latitude positions agree very closely, about 20° 15′ S.

It was difficult to find a good place in which to keep the two half-chronometer watches. To begin with, I carried one in a pouch at my belt and the other in a box just behind the driver's seat of the car in which I travelled. Mr. Reeves

handed over both these watches to me with a most satisfactory rate, but for some reason the one I wore began to give trouble as soon as we got out into the bush. This may have been due to the jars it received whenever I made the 4-foot jump to the ground out of the car, a thing I had to do fairly often to take note of the mileage between places registered by the mileometer fitted on the front wheel of each car. When the time signals began coming in, I found that this watch had a very large rate.

Left with one watch, I decided to take no chances as to the cause of the trouble, and so left the other watch in its pouch hanging up inside the box, where it maintained a fairly good rate during the whole journey. Its companion never recovered.

The aneroid was new and gave very good service. It was easy to read to hundredths of an inch, and seemed to be unaffected by the shaking and rattling it received. Having started its career with a certificate showing no error, it was pronounced by the authorities at the Perth Observatory to be still without error at the end of the journey. Furthermore, I had an opportunity to check it at Halls Creek by two readings which gave a result differing but little from the accepted height of this place.

The heights are worked out with Derby as a base station from readings for the same dates and hours kindly supplied to me by the Meteorological Office at Perth, and each place is fixed by means of at least two readings on separate days, and in many cases by means of many readings on different days. The difference between heights of which a mean was taken varies from 10 to 150 feet. I have discarded a few readings which for some reason or other were evidently widely in error.

I think it is interesting that my observations fix Gregory's Salt Sea at 1000 feet above sea-level. From this " Sea," which lies in a slight basin, the country rises gradually towards the west until the highest point is reached at the cliffs above Godfrey's Tank. The country beyond these cliffs, which run roughly north and south, appears to have sunk or broken away, and is at least 300 feet lower. The sand-ridges, which ran on a bearing of 92° whenever we encountered them, are discontinued for about a mile and then start again as soon as they get out from under the lee of the cliff. They then continue over nearly level country to Mount Cornish, which, by the way, is marked considerably out of place on the map we had, and is really a small hillock rising 90 feet sheer out of the slight rise on which it stands.

A mile and a half farther west a very much smaller breakaway occurs, beyond which the sand-ridges continue as far as the eye can follow them. About 30 miles away on a bearing of 267° from the cairn we built on top of Mount Cornish a curious three-peaked hill is visible, and farther north other small hills and a low range. I think it possible that another breakaway or stepdown occurs at that point.

I kept careful record of mileages and rough directions until we started steering by compass among the sandhills. The tracks which we had been following previously turned and twisted so much that it was impossible to keep accurate records of direction in the scrub.

At first it was very cold at night and in the early morning, and the temperature must have fallen often below freezing-point. The lowest temperature I recorded was 35° F. after the sun had risen at Bull Creek in the Northern Territory on 28 July 1925. The atmosphere is intensely dry, and anything wooden is liable to shrinkage and distortion. A parallel ruler became useless almost at once, and gaping cracks appeared in the theodolite boxes, letting in much dust and dirt.

LIST OF POSITIONS FIXED BY ASTRONOMICAL OBSERVATIONS IN CONJUNCTION WITH WIRELESS IN THE NORTHERN TERRITORY AND WESTERN AUSTRALIA

Place.	*S. Latitude.*			*E. Longitude.*		
	°	′	″	°	′	″
Camp 7 (1½ miles S. of Bore 5)	15	24	20*	132	09	55
Camp 13 (S.E. of Nellies Hole)	16	25	50	132	02	35
Monteginnie Station	16	40	10*	131	45	25*
King Creek Crossing near Townsend River	16	50	50	131	28	30
Camfield River Crossing	17	02	30	131	16	55
Wave Hill Station	17	26	55	130	50	50*
Swan Creek Camp	17	32	05	129	49	20*
Inverway Station	17	51	00	129	38	40
Gordon Downs Station	18	45	05*	128	34	50*
Lower Sturt Station	19	09	55	128	11	30
Billiluna Station	19	59	30	127	34	40*
Camp 39 (just E. of Godfrey's Tank) ...	20	14	20	126	41	15
C. 28 Well	20	15	20	126	31	10
Camp 45 (on Wolf Creek, E. Branch) ...	18	54	45	127	42	25
Oliver and Darcy's Station	18	35	50	127	37	50

Results are given to the nearest 5″.

* Cases where two stars were observed.

HEIGHTS

I. Northern Territory of Australia

(By comparison with Derby.)

Place.	*Heights above sea-level.*
	Feet.
Manbaloo Station	365
Bull Creek	470
Lake Wanalla	445
Camp 5 (10 miles S. of Bore 3)	450
Bore 5	530
Camp 7 (1½ miles S. of Bore 5)	540
Camp 8 (24 miles S. of Bore 5)	585
Bore 7	670
Nellies Hole	735
Camp 11 (E.N.E. of Nellies Hole)	770
Camp 12 (Peartree Creek)	745
Camp 13 (S. of Camp 12)	600
Camp 14 (on Stock Route)	620
Monteginnie Station	620
Camp 16 (Lonely Creek)	600
Camp 17 (King Creek)	420
Camp 18	440
Camfield River Crossing	440
Camp 20 (Barry's Nob)	520
Wave Hill Station	525
Camp 22	760

Place.	*Heights above sea-level. Feet.*
Camp 23	965
Camp 24 (N. of Swan Creek)	1300
Swan Creek Camp	1110
Watershed (10 miles N. of Inverway Station)	1530
Inverway Station	1300
Wallamunga Water-hole	1240

II. WESTERN AUSTRALIA

Place.	*Heights above sea-level. Feet.*
Border of Western Australia	1220
Salt Lagoon	1120
Gordon Downs Station	1150
Camp 29	1150
Lower Sturt Station	1130
C. 21 (Wolf Junction)	1100
Lake Stretch	1070
Billiluna Pool	1090
Billiluna Station	1120
Gregory's Salt Sea	1000
Weriaddo Well	1050
Guda Soak	1050
Camp 37	1130
Rock Hole (near Well 50)	1180
6 miles E. of Godfrey's Tank	1180
Cliffs above Godfrey's Tank	1360
C. 28 Well	1080
Mount Cornish	1190
"Fresh-water Swamp"	920
C. 25	1020
Wolf Creek (15 miles N. of C. 21)	1120
Beaudesert Station	1180
Oliver and Darcy's Station	1540
The Divide (9 miles N.W. of O. and D. Station)	1690
Camp 47 (Old Gold Workings)	1580
Mary River Crossing (near source)	1560
Lambo Station	1370
Mount Dockerell	1690

SOME EARLY COUNTY MAPS

Edward Heawood, Librarian, R.G.S.

NOT till well on in the sixteenth century did the rough general maps previously in use begin to give place to more detailed and accurate representations based on actual field-work. A movement in this direction then set in almost simultaneously in the principal European

countries, and before 1600 fairly detailed topographical maps were available for large parts of Italy, France, Germany, and the Netherlands, as well as of this country. The methods adopted are little known, though it is pretty well established that in certain cases, *e.g.* in the survey of Bavaria by Philip Apianus, some sort of triangulation was employed. In this country the nine years' labours in the field of Christopher Saxton and his helpers had by 1579 resulted in the completion of the famous county atlas, but we know little or nothing of the way in which the work was carried out. Nor do we know more of the *modus operandi* of Saxton's best-known successor, John Speed, whose 'Theatre of the Empire of Great Britain,' first published in 1611, was avowedly based to a large extent on Saxton's maps, corrected and extended, as its author implicitly if not explicitly claimed, by personal travel, the actual extent of which we have no means of knowing.

While the works of these two topographers are well known to the public, some amount of independent work was done by others, and it is the object of these notes to draw attention to some of this less-known work, on which recent discoveries, or re-discoveries, of maps of the period have thrown some additional light. Many points, it will be seen, still remain obscure and offer an interesting field of research to those who have the time and inclination to pursue the subject.

Before speaking of the County maps with which we are chiefly concerned, a word or two may be said about certain more general maps which offer equally interesting problems. Apart from the crude attempts of Pietro Coppo in the early sixteenth century, and the much-improved though still somewhat rough map of Sebastian Munster, first given in the Basel Ptolemy of 1540, the earliest printed map of these islands, with any claim to accuracy, is that of George Lily, printed at Rome in 1546, and copied many times in Italy during the next half-century. A far larger and more elaborate map was that brought out by Mercator in 1564, on the basis of a survey sent to him from England by an unknown author, the identification of whom offers a problem of great interest, perhaps hardly likely to be solved. This map first became known through the discovery of a copy at Breslau in 1889, but within the last few years two others have been found in Italy. It is certain that copies came to this country (the records of the Plantijn Press prove the fact *), so it is hardly too much to hope that a copy or copies may yet be unearthed in some of our English libraries. The earliest special map of England to be found in the Atlases of the time is that of Humphrey Lluyd of Denbigh, printed by Ortelius in his Atlas of 1573,† but this soon had a

* See Denucé: 'Kaartmakers,' 1, p. 21, where the despatch of a package of maps, including two copies of Mercator's "Anglia," to George Bishop, bookseller of London, is recorded under date 1568. On Bishop (who was afterwards one of the publishers of Camden's 'Britannia') see McKerrow: 'Dictionary of Printers,' etc., 1557–1640, *s.v.*).

† In the catalogue of maps given by Ortelius in his Atlas, Lluyd's is ascribed to 1569, but no issue of this date seems to be known.

rival in Saxton's general map given in his Atlas in 1579, which replaced Lluyd's in some of the later issues of Ortelius.

This small map of Saxton's was, however, but the reduction of a much larger and finer map, the very existence of which had been ignored by modern writers until attention was called to it by Sir George Fordham early in the present year (*Journal*, 67, p. 63). Yet later copies exist both at the British Museum and the R.G.S., while records of its original issue lay near to hand for those who cared to seek them. Ortelius, *e.g.*, in his catalogue of maps current in his time mentions the large general map as well as the sectional maps of counties, ascribing both, apparently, to 1580; while Gough in his 'British Topography' (edition of 1780, p. 89) quotes a later writer (Gregory) as pronouncing Saxton's the best chorographical map of the whole country, while giving the palm for county maps to his successor John Norden, of whom we shall have to speak shortly. The original issue of Saxton's large map is another item which calls for search in old libraries.

One other general map deserves a word of notice. In the English edition of Ortelius, brought out at Antwerp in 1606 by the publisher J. B. Vrints, there is, besides the map of England, one embracing also Ireland and the South of Scotland. This is said to be adapted ("accommodata") to Camden's 'Britannia' (which itself was without detailed maps till 1607) and bears the date 1605, which has hitherto been taken as that of the original issue. But during the present year an earlier version, dated 1594, has been discovered in an Ortelius of 1595, sold at Sotheby's. This differs from the later issue in having a portrait of Queen Elizabeth in the top right corner, and one reason for the scarcity of the map may be that it was perhaps mutilated for the sake of the portrait.* The paper used for this first issue has the large crossed arrows as watermark, and this is found too in various editions of Ortelius, some published by Diest, some by Plantijn; so that, as the same plate was used at Antwerp in 1605, the presumption is that the original was also issued there, although the same make of paper was used for one edition of Saxton. Even if the map were intended as a companion to the 'Britannia,' its issue at Antwerp need not surprise us, for we know that Camden and Ortelius were on terms of friendship, and a letter has been printed in the Camden correspondence (1691) in which Ortelius advises Camden as to the production of maps for the 'Britannia.' To this we will return later.

While Saxton undoubtedly led the way with his complete set of County maps, special maps of certain counties were produced independently before the end of the century. The R.G.S. possesses a copy of Lambarde's

* This does not appear to be in the B.M. Collection of portraits of the Queen. In O'Donoghue's catalogue there is, however, mention of one "in the centre of a genealogical tree" (in the map in question it is at the top of one), but without assignment of provenance or statement where it is to be seen.

'Perambulation of Kent, (first edition, 1576) containing a map of the county not found in any other known copy. While concerned with Kent only it agrees closely with the corresponding part of Saxton's general map of the South-Eastern Counties, but shows a good many differences in detail, one of which brings it into agreement with "The Carde of this Shire" referred to in Lambarde's text. The subject is being dealt with elsewhere by Mr. E. G. Box, a student of early Kent topography, who thinks that the map may have appeared before Saxton's, though possibly by agreement with him and with the use of his material. A much finer map of Kent, certainly made independently of Saxton, is that of Phil. Symonson of Rochester, the earliest issue of which is a great rarity, if indeed it has survived at all. Copies with the name of Peter Stent as publisher are in the possession of Mr. Henry Hannen and of the R.G.S., but as there is no record of any Peter Stent in business before 1643 it is almost certain that both copies are re-issues (although they bear the original date 1596), especially as the paper-mark, at least of the R.G.S. copy, indicates a date well on in the seventeenth century. A copy of the eastern half only is owned by Archdeacon Livett, and is certainly earlier than the other two (being without Stent's name), though whether even this is the real original issue is open to question. Mr. Box has pointed out to me that an important feature in the map as known to us is the insertion of the roads, and it is remarkable that neither in Symonson's own description, nor in Lambarde's reference to the map in the second edition of the 'Perambulation,' is there any mention of roads, so that they may have been added later, as was certainly done in a second issue of the smaller map already spoken of.

A certain amount of material for British local cartography was also produced in MS., though some of it was not printed till much later, and some may have been lost altogether. In 1585 William Smith, a voluminous writer on heraldic and kindred matters, penned a description of Cheshire, accompanied by a folding map of the county and views of Chester and Halton. Several copies still exist, and both it and his 'Particular Description of England' (1588, first printed in 1879) seem to have been used by later writers. The larger work was illustrated by a map of England, and by plans and views of the principal towns. Several contemporary MS. maps have been added to Lord Burleigh's copy of Saxton in the British Museum, including one of the Isle of Wight by Thos. Mayne, and one of the Bishopric of Durham.

Several years before the century closed another enthusiastic topographer, John Norden, had started an ambitious enterprise, which he was able to carry out only in part—that of a complete topographical description, by counties, of the whole of England, with accompanying maps, which were to be improvements on Saxton's based on his own surveys. Very little definite information exists about Norden's

work, and the subject would repay careful research. It is uncertain how many county maps were actually produced by Norden, the engraved originals of most that are known being excessively rare, while others may have been lost. Two of the known examples, now in the R.G.S. Collection, have in fact been brought to light only within the past decade. The question is complicated by the extensive use of Norden's maps, sometimes without acknowledgment, by his contemporaries, and as the MS. versions of some (which still survive) may have been used, it is not certain that he published engraved editions of all. The only counties for which maps with letterpress descriptions actually appeared in his own time were Middlesex (1593) and Herts (1598), those for Cornwall and Essex having been printed much later. Of the original printed maps of Surrey (1594) and Sussex (1595) unique examples have been secured by the R.G.S., and an early re-issue of the Surrey, probably of about 1604, has been reproduced by Messrs. Ellis of Bond Street from a unique copy lately in their hands. Later issues of the Hampshire, by Peter Stent and his successor John Overton, are also known, reprinted with slight alterations from the original plate, as is shown by the retention of the Royal Arms as borne by Queen Elizabeth, and by the close agreement with the original MS. map at the British Museum. Another county map certainly drawn by Norden—that of Kent—is known only from the copy given by Camden in his 'Britannia' of 1607; and search might reveal either the original MS. (Gough stated that the MS. of the *Survey* of Kent still existed in his day, but does not say whether it included a map) or an earlier printed version. A comparison of the map in Camden with Saxton's shows the extent to which Norden's version differed, for it not only contains far more detail, being on a larger scale, but shows the courses of the rivers (*e.g.* the lower Medway) and other natural features much more correctly. Much may have been copied from Symonson, but there are at least some original features. Besides the eight counties already spoken of, Norden is known to have made a survey and map of Northants, detailed reference being made to the map in his brief description of the county, not printed till 1720. It must have closely followed the general plan of the maps known to us. We shall have to speak presently of an almost contemporary printed map of this county which is some improvement on Saxton's and must have been based in part on an independent source—possibly Norden. But the series in which this occurs shows certain traces of originality in other counties also, with which there is no positive ground for associating Norden. Still, in view of his known activity as a surveyor, it would not be surprising if his work on other counties than the above should be substantiated.

We now come to a limited series of maps, produced in the opening years of the seventeenth century, the very existence of which has hitherto been almost ignored, as they are scattered in various miscellaneous collections, and the original issues of some have come to light only within

the past decade. The majority of these early issues are without the name of either author or publisher, and there is a wide field for conjecture as to the circumstances of their publication. By the help of much later re-issues by the map-sellers Stent and Overton (probably about 1650–70), just a dozen of this series can be traced, with a distinct family likeness throughout. Some, even of the late re-issues, continue to bear the old dates 1602 and 1603. Others are undated both in the early and late issues, but there can be little doubt that all did appear round 1602. For Northants, one of the undated maps, this is proved by the use of a certain symbol for "Manners and places of *Queen Elizabeth*." The eight survivors of the original issue (of which the R.G.S. possesses seven, the British Museum at least three, of which two are identical with two of the R.G.S. set) are all printed on paper with the same watermark—the horn on a shield of the style shown in No. 89 of the marks figured in the *Journal* for May 1924, which is found on various maps and books of the time, published both at Antwerp and in Holland. The engraving too is distinctly of the Dutch or Flemish style, and there can be little doubt that the maps were produced abroad. The one instance of a publisher's name engraved on a map of this series, points in the same direction. Over a half-erased inscription attributing the map to Christopher Saxton, the Essex (dated 1602) bears the name of Hans Woutneel, a Flemish bookseller settled in London, known to have published a portrait of Queen Elizabeth in 1592. Naturally the maps would be based on material supplied from this country: the foundation of all is in fact the maps of Saxton and Norden, though with differences enough in detail to show that some first-hand knowledge was brought to bear on their preparation.

As has been said already, these twelve maps show a distinct family likeness, the following being special characters common to most if not all. The titles are in Latin, and the name of the county is followed by a statement of the number of Market towns within it ("continens in se oppida mercatoria . . .," or some similar phrase). In one corner is a table of the hundreds ("Nomina Hundredorum"), with a reference to their position on the map by means of letters.* Another table gives the key to the meaning of the symbols used to denote market towns, Royal and Gentlemen's houses, and so on. The last two features are prominent also in two at least of Norden's published maps, from which they have no doubt been taken over, and the dependence on these for some of the counties is shown also by the insertion of the roads (almost exactly as by Norden, the originator of the practice) in the maps of Surrey, Essex, and Herts. But roads are given also for Warwick, which suggests the question whether Norden may not also have surveyed this county, and

* Saxton's Norfolk alone has a table of Hundreds with letters showing their places in the map, and both this and Suffolk give the number of market towns, etc., by the same formula as in the maps of *c.* 1602–03.

perhaps made a map which has not yet been discovered. On the other hand some of the maps are close copies of Saxton's, whose name appears definitely as the author of the Norfolk and Suffolk, and is to be seen, partially erased, on the Essex. Norden, we know, made a survey of Essex, but as his map remained unpublished till the nineteenth century, it would not be surprising if it were not accessible to the publisher of the map of 1602.* Yet the roads are shown almost exactly as by Norden.

It is worthy of notice that several of the counties for which these new maps were made about 1602–3 had formed only parts of sheets in Saxton's Atlas, and had thus been shown on a small scale only. Warwick and Leicester were on one sheet, and Northants too was one of a group of counties, so it is quite natural that these would be among the first to be taken in hand in an improved issue. It is evident that, where Norden's maps were available, they were generally regarded as an improvement on Saxton's, for they were used not only for the series now under consideration, but also by Camden and Speed.

It is difficult to form an opinion whether or not the dozen maps that have so far come to light are all that ever appeared in this series. If all were known both in the originals and the re-issue, we might fairly conclude that no others were made. But as four have survived in the re-issue only, it may well be that a few others have been lost to sight altogether. But since Stent and Overton, while re-issuing all the above twelve maps, went back to Norden's original for their re-issue of the Hampshire, it seems most likely that this county at least was not included in the series under discussion.

Details of these maps are given below, but a word or two may be added here on the question under whose auspices they were originally brought out. The name of Woutneel on the Essex suggests that the scheme may have been initiated by this bookseller. Yet there are too many signs of first-hand knowledge to encourage the idea that he can have carried it out on his own resources only. The close copying of Norden's maps, where available, makes it seem possible that he was at least associated with the undertaking, but an alternative is that Camden was in part responsible, for, as we shall see presently, these very maps were evidently used in the preparation of the set for the 1607 'Britannia.' Yet Camden gives only Saxton and Norden as the original makers of the 1607 maps. The letter of Ortelius to Camden quoted above was written in 1589, and it shows that even then Camden was planning the issue of maps to illustrate the 'Britannia,' and that he was advised to employ a Dutch engraver for the purpose.† It is true that quite small

* It is somewhat puzzling to find that the map of Essex given by Speed, though attributed by him to Norden, is far closer to Saxton than to Norden's MS. map first published by Sir H. Ellis in 1840.

† This was the survivor of the brothers Jan and Lucas van Doetecum of Haarlem, engravers of so many Dutch maps of the period, including many published by De

maps seem then to have been contemplated, for Ortelius quotes a price on the basis of a size similar to that of maps in his minute 'Epitome Orbis Terrarum.' But Camden's views may have been more ambitious, and he might conceivably have started the enterprise on a scale which he afterwards found it impossible to adhere to. But this is of course a pure guess. A third English topographer alive at this time was William Smith, whose 'Description of England' (1588) has been referred to already. It is perhaps worthy of mention that the Warwick map of 1603 in the anonymous sets agrees with this writer in giving "Bermicham" as the popular alternative to the older "Bromicham" found in Saxton. But this hardly justifies us in arguing a connection between the two.

Whoever may have been the collector of new material in this country, there is good reason to conclude that most at least of the twelve maps were both engraved and printed at Antwerp.* (The Essex is not quite in the same style and may not belong to the same set, though the paper seems the same.) A careful comparison of the style of lettering in the rest with that of other maps of the period brings out an almost complete identity with that of the later maps in the Atlases of Ortelius, and we can hardly escape the conviction that both sets were engraved by the same hand. In the first edition of his Atlas Ortelius credited Franciscus Hogenberg with the making of most of the maps, but this noted engraver died in 1590 or 1591, and from 1595 on Hogenberg's name is coupled with those of the brothers Ambrose and Ferdinand Arsenius, who may therefore be put down as the engravers of such maps as appeared after Hogenberg's death. The lettering of these so well carries on the style of some, even of the earlier maps, that we may suppose either that the brothers were trained by Hogenberg and inherited his style, or that they had a hand in some of the earlier maps also.† Another reason for believ-

Jode, either in his Atlases or separately (see Denucé, 'Oud-Nederlandsche Kaartmakers,' Antwerp, 1912–13, *passim*). In connection with his recommendation to Camden it is interesting to note that, according to Denucé, the *Bibliothèque Nationale* in Paris possesses a map engraved by "Baptista" [? Joannes] Doetichomius: 'Angliæ, Scotiæ, et Hiberniæ sive Britannicarum Insularum Descriptio,' which seems not to belong to any of the Atlases of the time (*Ibid.* 1, 206).

* Or possibly at Cologne, the seat of the Hogenberg school, where Ortelius' maps may have been actually produced.

† Members of the Arsenius family, nephews of Gemma Frisius, were noted makers of Astrolabes. Examples by Reiner and Walther of Louvain, and by Ferdinand of Antwerp are quoted by Gunther ('Early Science in Oxford,' vol. 2, pp. 216, 219, 232 from 1565–71. As a Ferdinand was still correcting maps for the 'Parergon' of Ortelius in 1624–28 (Denucé: 'Oud-Nederl. Kaartmakers,' vol. 2, pp. 142, 244), it seems likely that we have to do with a father and son of the same name.

While the lettering in question is of a style also affected by Hondius (examples of somewhat similar letters are given in his 'Theatrum Artis Scribendi' of 1594), it presents certain special characters, particularly in the cursive capitals, and the finely formed Roman S. Apart from the rather overdone flourishes to the cursive letters, it is perhaps about the best work of the kind, even of that artistic age. A somewhat similar style is to be traced in the maps in Adrichomius, 'Theatrum Terræ Sanctæ'

ing that the maps were produced at Antwerp is the fact that the paper used bears the same watermark as the Ortelius Atlases of 1603 and 1606, published at Antwerp by J. B. Vrints (or Vrients); and when we consider that Vrints gave in 1606 a map of the British Isles, also with the characteristic lettering of the county maps, we are tempted to guess that the issue of these was a venture of Vrints', if indeed it had not been planned by Ortelius before his death in 1598; for it will be remembered that the first issue of the British Isles map is dated 1594, was found in an Ortelius of 1595, and is printed on the same paper as this last.

It would not be at all surprising if Ortelius had meditated an issue of English county maps, considering the relations kept up by him with friends in England (his intimacy with Camden has already been referred to), some of whom were refugees from Flanders on account of the religious troubles. His cousin Emmanuel van Meteren was long resident in England, as were also his sister's husband, the merchant Jacob Cool ("Cole" or "Colius"), and the latter's son (also Jacob), for whom Ortelius in his letters published by Hessels shows a special regard, and who eventually added the surname Ortelianus to his own. He was on friendly terms with Camden and Hakluyt and also with his compatriot, the bookseller Hans Woutneel, who acted as agent for Ortelius in various transactions. We have seen that this man's name appears as the publisher of the 'Essex' in the series under discussion, so that we have some sort of a link between it and Ortelius, who must at least have been cognisant of the projected issue. But nearer than this it seems impossible to come, for in the published 'Letters' (only a fraction it is true of the whole that once existed) there is no trace of any such plan as in contemplation. We learn from one letter from Ortelius to his nephew (No. 229) that the latter had sent over *some* information of use for the 'Theatrum' and there is also (Letter 218) a somewhat cryptic reference to an English work which it was wished to secure (copies had been previously obtained by Woutneel through Richard Verstegen, *i.e.* Rowlands the antiquary) but about which Ortelius thought it well for certain reasons to keep himself in the background. As it appears from some of the letters that Ortelius had been cautious about allowing his great plan of the 'Theatrum' to become known before it approached completion, it may be that any plan for an issue of English County Maps would equally be kept dark in its early stages. But the work referred to is perhaps more likely to have been concerned with the religious controversies of the time, from which Ortelius made a special point of holding aloof, but in which

(Cologne, 1590, etc.), almost certainly the work of F. Hogenberg. Ortelius kept in close touch with the Cologne geographers, many of whom were Netherlanders. In England, traces of the same style are to be seen in the work of Charles Whitwell, engraver of Symonson's map of Kent, and this is no doubt to be explained by the fact that Whitwell had already, in 1591, re-engraved Hogenberg's plan of Jerusalem for an English version of Adrichomius's Description of Jerusalem.

Verstegen was involved. We are therefore still in the region of pure conjecture in the matter.

A comparison of these maps of 1602–3 with the later series of Camden and Speed offers some points of interest, showing that even where maps are attributed by these two topographers to Saxton and Norden, the intermediate series above discussed was used by both to some extent. In most of Camden's maps of counties represented in the 1602–03 set the characteristic features of the latter are reproduced, but in few if any of the others—another reason for doubting whether the series was ever carried further. A striking evidence of copying is given by the maps of Stafford and Northants, in both of which in 1602–03 the north was placed to the right, as is done for both by Camden, there being only one other instance—the Wiltshire—of a departure by him from the usual practice, and here the north is on the left. Camden gave tables of Hundreds for eleven counties only, and it is significant that while he could copy Saxton or Norden for six of these, for all the rest he would find the tables ready to his hand in the 1602–03 series, which is in fact the only previous cartographical source known to us. His dependence on this is made a practical certainty when we find him using an identical set of letters or numbers to denote the location of the hundreds on the map. Similarly an explanation of the symbols for towns, villages, and so forth, is not given by Camden for any counties not already provided with it either in the maps of Norden or in the anonymous set—and not for all of these. Again, while the spelling of names in the Camden maps differs considerably from Saxton's, it often shows a close agreement with that of the maps of 1602–03.* Lastly, while the intermediate set added largely, in certain counties, to the places shown by Saxton (the maker claimed 60 such additions for Warwick, 80 for Leicester), most of these new names are also to be found in Camden.

The use by Speed of the 1602–03 set is not quite so obvious, but there are indications of his dependence on it to a limited extent. As Speed gives the names of the hundreds throughout (both on the maps themselves and in the lists on the back) he must have had independent sources of information and there is no reason to argue that he used the lists of his predecessors for any. Where Saxton's maps were fairly adequate, he copied them pretty closely, but where, through the grouping of counties, Saxton's were on a small scale, he evidently drew upon the more detailed

* The following are a few of the many instances of agreement between Camden and the anonymous set, where both differ from Saxton, whose version is given in brackets. In *Northants:* Higham Ferrers (Feries), Peterburgh (-burg), Harborow (Herboro), Owse (Ouse), Aino (Ayno); in *Leicester:* Toly Park (Woley), Ulvescroft (-cot), Kir(k)by Malory (Kirkby only), Harburgh (here for Haverburgh); in *Warwick:* Bromicham vulgo Bermicham (Bromycham only), Lemington Priors (Lemyngton only), Coleshill (-huil), etc. A general characteristic of the anonymous set, also found in Camden, is the dropping of redundant letters and the use of *i* for *y*. This shows once more that we have not to do with mere slavish copying by a foreign engraver.

maps of Norden or, more rarely, upon the 1602–03 set (with due acknowledgment in the first case, without it in the second), no doubt adding a good deal from his own knowledge or inquiries. Traces of borrowing from the last-named are naturally most conspicuous in the counties where important additions had already been made in 1602–03, *e.g.* Warwick and Leicester. On the other hand Northants has the north at the top in the usual way and the spellings show no definite connection with the map in the anonymous set. Nor is such to be seen in the maps of Lancashire, Cheshire, or Worcester, for which Speed was content to follow Saxton in the main. For his Norfolk, however, Speed copied the ornamental border of the intermediate version, not that of Saxton's original, and follows the same version also in the few additions traceable.

It would be an interesting study, though one involving much research, to analyse Speed's maps in detail, so as to decide how far they embody original information and how far they are merely compilations. The omission of Saxton's name from many of them (while it is mentioned in others) has suggested to some writers that the changes in the former were great enough to justify us in considering Speed as their real author.* But a good many from which Saxton's name has dropped out are practically unaltered (though re-engraved) versions of the pioneer set. Speed's use of the term "performed" to describe his part in the production is a cause of ambiguity, for while it might be thought to imply original work, in some cases at least it evidently does not, in itself, as when we find a map avowedly based on Saxton described as "augmented and performed by John Speed." Here "performed" (like the "fecit" of the Latin signatures of many maps) may merely mean "drawn," or it may be meant as the equivalent of "published," which is used in the same context in some of the maps. One map in which at first sight there might seem to be special traces of originality is that of Kent, its larger scale permitting much greater detail than is given by Saxton, while there is no very close agreement with Norden's map used by Camden. But a comparison with Symonson shows that it is little more than a reduced copy of the latter, apart from the plans of towns added. In all his maps Speed falls short of Symonson, as well as some of the maps of Norden and the anonymous set, by the omission of the roads.

Some of the most important additions made by Speed were no doubt the plans of towns, coats of arms, and portraits inserted in the blank spaces round the maps, but it is difficult to say how many of the plans were the result of personal survey or inquiry. Some were certainly borrowed, though with one exception (William Mathew's 'Newcastle') the real authors' names are not stated. That of Durham city is a close copy of one by Christopher Schwytzer (engraver of the unique copy of

* Gough considered that the maps issued by Lea about 1690 were to be counted as Speed's rather than Saxton's, though most were actually printed from Saxton's old plates, with corrections and additions, some taken from Speed.

Norden's Sussex owned by the Society) of which examples exist in the British Museum and in Cambridge University Library. Peterborough, too, seems almost certainly copied from a lost plan drawn by Norden (or from an unknown common source), for in his short account of Northants first printed in 1720 Norden happens to supply an explanation of the figures used to denote streets or buildings in the plan itself—12 in all. Now exactly the same twelve features are similarly described by Speed, in precisely the same order, at the foot of his plan, the only difference being that he uses letters instead of numbers. This is surely a sufficient proof that the two plans were not produced independently. London appears to be taken direct from Norden, rather than from the large-scale plan of Ralph Agas. For both Oxford and Cambridge Speed could base his plans on the large-scale surveys of Agas, preserved in the Bodleian. For Chichester he has merely copied the plan in the corner of Norden's map, using the same explanatory letters, though adding three of his own. For Norwich, he had a pattern in Cuningham's plan, given in the 'Cosmographical Glasse' as early as 1559, or in the version by William Smith in his MS. 'Description of England' (1588). Bristol too ("Bristow") comes so near Smith's that the likeness can hardly be accidental.* For some there is a claim to original work, *e.g.* those of "Penbroke" and Saint David's, which are "shewed in due form as they were taken by John Speed." The same may no doubt be true of other plans for which no such definite claim is made. And it is just possible, though hardly likely, that certain plans issued independently before the publication of the 'Theatre' might really be based on Speed's work, which must have been in progress for some years before the whole was given to the public.

One contemporary testimony to the value of Speed's labours is that of John Norden himself, and as given by a rival, to some extent, in the same field, its force is all the greater. In his 'Intended Guyde for English Travaillers' (1625, etc.), when explaining the use of his tables of distances between towns, he writes, "I have beene enforced, to borrow the helpe, as well of mine owne Maps which I have made, by travaile of divers Shires: now totally finished by the laborious travailes of Mr. Speede, whose Maps together with Mr. Saxton's and mine owne, have been the principall direction in this tedious worke." Anyhow, Speed did valuable service in bringing together much scattered material, though he can hardly be placed in the same rank with Saxton, whose

* Smith says that this city was "measured & laid in Platforme by me . . . the 30. & 31. July Anº Dnī 1568." The plan given in Braun and Hogenberg's 'Civitates Orbis Terrarum' (Part 3, Cologne, 1581) is also so like Smith's that one might think the original draft to have been supplied by the latter to the German editors, particularly as we know that he lived some time at Nüremberg. A similar resemblance between the "Norwich" of Braun and Hogenberg, Smith, and Speed, is also to be seen, but this is due to the fact that each has followed Cuningham, directly or indirectly.

maps formed the ultimate foundation of all that were before the public until the time of John Ogilby.

LIST OF KNOWN MAPS OF THE 1602–03 SERIES

[I. = original issue; II. = Reprint. R.G.S.(a) refers to a miscellaneous collection, formerly at Chadacre Hall, Suffolk, purchased by the Society in 1919 (see *Journal*, **55**, p. 67); R.G.S.(b), one purchased in 1924 (*ibid.* **64**, p. 58). B.M.(a) is a miscellaneous collection at the British Museum with press-mark Maps 24.e.28; B.M.(b), a volume of county maps mostly published by John Overton: press-mark K.I.Tab. 25; B.M.(c), a similar volume of maps by John Seller and others, press-mark K.I.Tab. 18. Publishers' names in brackets.]

Surriæ Comitatus, 37·6 × 48·5 cm. I. R.G.S.(b); II. B.M.(b) (Stent; Overton). After Norden, with roads.

Hartfordiæ Comitatus Nova Descriptio, 39·5 × 48·9 cm. I. R.G.S.(b); II. B.M.(b) (Stent; Overton). After Norden, with roads.

Essexiæ Comitatus descriptio. 1602. 40·7 × 51·3. I. R.G.S.(a), B.M.(a) ("Hans Woutneel exqudebat" over half-erased "Christophorus Saxton descripsit"); II. B.M.(b) (c) (Overton). Close copy of Saxton, on same scale, with some corrections. Roads nearly as Norden.

Suffolciæ Comitatus Accurata descriptio . . . Auctore Christophoro Saxton. 33·3 × 47·1 cm. I. B.M. (a); II. B.M. (b) (Stent; Overton). After Saxton, re-engraved.

Norfolciæ Comitatus Descriptio . . . Auctore Christophoro Saxton. 33·3 × 48·2 cm. I. Not known?; II. R.G.S. (a), B.M. (b) (Stent; Overton). After Saxton, re-engraved.

Northamptoniæ Comitatus descriptio. 36·6 × 48·8 cm. I. R.G.S. (a); II. B.M. (b) (c) (Overton). Larger scale than Saxton, and spellings altered; north to right.

Lecestriæ Rutlandiæq. Comitatuum Delineatio . . . Anno 1602. 35·8 × 49·7 cm. I. R.G.S. (b), B.M. (a); II. B.M. (b) (c) (Stent; Overton). Stated to be after Saxton, but is a good deal larger, many names added.

Warwici Comitatus Descriptio . . . Anno 1603. 39 × 46·4 cm. I. R.G.S. (b); II. B.M. (b). Stated to be after Saxton, but is larger, with many names added. Roads inserted.

Staffordiæ Comitatus. 34 × 46·9 cm. I. R.G.S. (b); II. B.M. (b) (Stent; Overton). Generally after Saxton, but north to right.

Cestriæ Comitatus Palatinus. 36·6 × 47·7 cm. I. not known?; II. B.M. (b) (Overton). Generally after Saxton, but differs in spellings and other details.

Lancastriæ Comitatus Palatinus. . . . 37·1 × 47·5 cm. I. not known?; II. B.M. (b) (c) (Overton). Generally after Saxton, but somewhat larger, and many spellings differ; north to right. (Notes that though there are only 36 parishes, they are unusually populous.)

Vigorniensis (vulgo Worcestershire) Comitatus Descriptio. 35·9 × 47 cm. I. not known?; II. B.M. (b) (Stent; Overton). Close copy of Saxton, apart from spellings.

Note.—The Essex and Suffolk give the names of the Hundreds in their proper places in the maps, as Saxton did for these counties. All the rest give them in tables in the corners.

THE LANDFALL OF COLUMBUS

AT the end of 1924 we received a letter from a correspondent on Grand Turk enclosing copy of a paper read before the New York Historical Society on 6 October 1846 by the Hon. George Gibbs of Grand Turk, contending that this island was the San Salvador where Columbus first set foot in the New World. The letter ended " If entitled to it Grand Turk wants the honor, so kindly lend us your influence in establishing the claim."

We were compelled to reply that " the ideas of Mr. Gibbs have been fully considered by later writers and rejected by nearly all of them. Most agree in accepting Watling Island as the probable landfall; but there is no one island in the Bahamas group which meets all the requirements of the narrative, and it is not likely that the question can ever be definitely solved."

The Admiralty are however more confident. The 'West Indies Pilot,' vol. 3 (1921), says:

" San Salvador or Watling Island, the established landfall of Columbus in October 1492 . . . "; and the Admiralty Chart of the West India Islands and Caribbean Sea has: " San Salvador or Watling I., Landfall of Columbus Oct. 1492."

Yet it seems that somehow or other the neighbouring and larger Cat Island has succeeded in annexing the name and fame of San Salvador, so that it has been thought necessary to regularize the matter by the unusual method of an Act of Parliament. We have received through the Colonial Office the text of " An Act relating to the names of the Islands generally known as San Salvador and Watlings Island (16 and 17 Geo. V. Chapter 27, assented to 6th May 1926," with the report of the Attorney-General thereon. The latter runs thus:

" 1. The Short Title of this Act is The Cat Island and San Salvador or Watlings Island Names Act 1926, and I am of opinion that the assent of His Excellency the Governor may properly be given to this Act.

2. It has been definitely proved that the landfall of Columbus in the New World was on that Island of the Bahamas commonly called Watlings Island but by Columbus named San Salvador. For some time there was doubt as to whether or not Cat Island might not really be the San Salvador of Columbus, but Cat Island was always referred to in grants until the year 1800 as Cat Island when the alternative name, San Salvador, began to creep in. The island has always been known to the inhabitants as Cat Island, and Cat Island it should remain as it is now definitely settled that it is not the San Salvador of Columbus.

3. Watlings Island presents more difficulty as the original name given it by Columbus was San Salvador, but that has fallen into disuse. In view, however, of the fact that it has been definitely settled that Watlings Island is the San Salvador of Columbus and as the name of " San Salvador or Watlings Island " appears in the Admiralty Charts and the island is referred to as San

Salvador in the West India Pilot, a book used throughout the mercantile world, it is highly desirable that the name should be settled once for all. The importance of this step is more forcibly brought to the fore when it is considered that a Wireless Station is being erected there, and the name of the island on which the station is erected should be finally settled.

4. The object of this Act is to take from Cat Island the name San Salvador which it has endeavoured to usurp and which it is admitted does not belong to it, and to give that name to Watlings Island to which it really belongs. The name "Watlings" has been retained in addition to San Salvador to avoid complication which must result in grants, deeds and other legal documents if that name is entirely removed from existence and also the fact that "Watlings" has been known as "Watlings" since the British occupation, and is thus known to the local inhabitants.

H. C. F. Cox,
Attorney-General.

Attorney-General's Chambers,
Nassau, 5th May, 1926.

And the three clauses of the Act are :

1. This Act may be cited as The Cat Island and San Salvador or Watlings Island Names Act 1926.

2. From and after the coming into force of this Act

(i) The Island now generally known as San Salvador or Cat Island shall be called and referred to as Cat Island, and

(ii) The Island now generally known as Watlings Island shall be called and referred to as San Salvador or Watlings Island.

3. Wheresoever in any Act, Order in Council or Rule passed or official notice published before the coming into force of this Act reference is made :

(i) To the Island of San Salvador the same shall unless the context otherwise requires be construed to mean Cat Island, and

(ii) To Watlings or Watlings Island the same shall unless the context otherwise requires be construed to mean San Salvador or Watlings Island."

It is curious that the Report and the Act should allow that Cat Island is "now generally known as San Salvador or Cat Island," although both the inhabitants and the Admiralty always call it Cat Island ; and still more strange that the alternative name Watling Island of the Admiralty Chart and Pilot should by Act of Parliament suddenly become Watlings Island. Moreover, it would appear that any "official notice" issued by the Admiralty before 6 May 1926 referring to San Salvador would be construed in the Court at Nassau as referring to Cat Island "unless the context otherwise requires," which it might fail to do.

This sudden resolution of a geographical problem by Act of Parliament of a Colonial Legislature may thus have interesting results.

THE SCOTT TRAGEDY

Scott's Polar Journey and the Weather.— G. C. Simpson, F.R.S. Oxford: Clarendon Press.

IT was peculiarly appropriate that, when asked to deliver the Halley Lecture for 1925, Dr. Simpson should have selected as his subject meteorological factors of the environment which brought about the deaths of Captain Scott and his companions. Halley's short career as an explorer is one of the outstanding illustrations of the fact that the scientist needs other qualities than his professional attainments to make a successful leader: Scott affords an equally striking example of the truth that an efficient seaman endowed with scientific curiosity can be a decisive success as the leader of the modern scientific expedition.

The thesis of the lecturer—that the main cause of the Scott tragedy was the weather to which the party was exposed—seems to the writer to be tenable; but several of the points raised would bear more consideration than can be given to them in a short review. To Dr. Simpson we owe the first satisfactory explanation of the sequence of events which has long been familiar to the explorer in southern regions as the dreaded "blizzard," and the part played by the December blizzard in the story of Scott and his companions cannot be easily overemphasized. Scott from the first decided that the arrival of Amundsen on the scene should not be allowed to alter his plans, and therefore, in the sense of a human rivalry, a race for the South Pole did not take place. From the point of view of the polar environment, however, the journey was bound to develop into a struggle against time and temperatures, for Shackleton's experience, with similar transport, had shown that the distance out and back could only just be covered in that period of the year within the limits of which any long journey under the harsh conditions of manhauling must be confined. The employment of pony transport necessarily was the limiting factor as regards the date of starting, for ponies cannot survive cold weather even under the *régime* evolved by Shackleton and Oates. At the other end of the "navigable" period comes the inevitable autumn seasonal drop of temperature. Along the Barrier the parties were all making satisfactory and even unexpectedly good progress until on December 4 the great summer blizzard not only held them up completely for four whole days, but—a yet more serious consequence—completely altered the nature of the work for the next week on the lower slopes of the Beardmore Glacier. Throughout the outward journey Shackleton's team naturally played the part of a ghostly pacemaker in the race. Urged on by a leader of tremendous physique, of impatient temperament, and for the time being obsessed with one dominating idea, the sledge parties toiled early and late until at last Scott was able to record in his diary that the loss of time on Shackleton's schedule had been made good. At what cost this had been accomplished was not realized until later, on the return journey, the polar party itself began to fail.

The party, drained of its reserves of strength during this tremendous and unexpected struggle up the glacier, was in no case, even without the errors of strategy which went far to increase its handicap, to stand up against the further blows which the weather had in store, and which were, in the writer's opinion, normal to the situation and the season in which they were met. All who have studied the problem and who write from knowledge or experience agree that the bad surfaces on the plateau and, on the return journey, on the Barrier

were main factors in bringing about the final tragedy. These bad surfaces in their turn were chiefly due to the presence of a peppering of loose snow crystals upon the surface of the wind-hardened snow sastrugi. These acted efficiently as a brake to the sledge runners, playing a part akin to that of loose sand under desert conditions. Undoubtedly surface conditions deteriorate progressively with decrease of temperature, but this alone is not nearly sufficient to hold a party up in country which is habitually swept by periodic gales as is, for instance, the Ross Barrier.

That low temperatures alone are not enough to ruin sledging conditions has been shown by the experiences of other parties. Amundsen with his dogs covered 37 miles in the autumn in low temperatures after a fall of temperature to —45° F., but with a south-east gale intervening to sweep away the rime. Again, he marched 46 miles into Framheim after recording temperatures of —68·8° F. the previous day. Cherry Garrard, during the winter journey to Cape Crozier, refers to "perfect weather and good travelling" at — 55·3° F. to —63·2° F. Our own party in the north of Victoria Land managed pulls of 15 to 20 miles—manhauling—with heavily laden sledges in temperatures below —20° F. and without sun. The factor which slew the Southern Party was not so much the low temperatures as the *fall of temperature* with its accompanying deposit of fog crystals. In the centre of the plateau southerly winds breasting the slow rise from the Pole towards the Ice Divide: on the Barrier in late February and March the autumn seasonal fall at the period of maximum open sea, both provide ideal conditions for such deposition. During the latter decisive period of the march the conditions were exaggerated by abnormally calm and therefore abnormally cold weather, which was perhaps associated with the presence of an unusual amount of ice in the Ross Sea for the period of the year.

How far the conditions which were the cause of the *Terra Nova's* failure to pick up the Western and Northern Parties at the appointed places and those which caused the destruction of the Polar Party were associated phenomena one cannot tell in the absence of sufficient data. That the weather in the autumn of 1911 to 1912 was abnormal appears likely: whether the tragedy would not have taken place if the weather had been normal is a different and difficult question. The incidence of the great March blizzard commencing on March 21 undoubtedly appeared to Scott and his unfortunate companions the decisive factor in their fate. It is very doubtful, however, whether, had that blizzard not arrived, the debilitated party could have made Hut Point. At the time they were held up their day's march was reduced to 5 or 6 miles. At the Depôt there were three weeks' provisions: they had 150 miles to cover to bring them to safety. All were badly frostbitten, and Scott himself says earlier that he had nothing better than amputation to look forward to. One cannot but think that their average march would have decreased rather than increased, and that long before they could have reached their haven they must have given up the struggle and died.

While recognizing the dominant influence of the weather in bringing about the tragedy, however, it is important not to lose sight of the rather numerous predisposing circumstances in which the meteorological conditions played no part. Foremost among these, or so it seems to the writer, must be placed Scott's disastrous and hurried decision to change his party from four men to five. We know the decision was taken hastily, for otherwise why was Bowers instructed to leave his ski behind when the remainder of his unit depôted them some four days before the redistribution? We have the anomaly of the

man in the party who possessed the shortest legs trudging ankle-deep and deeper in soft snow for 200 miles and more while his companions on ski pulled upon a higher plane in every sense. What Scott's motives were we can only guess: doubtless they were high; equally certainly the policy was a grave mistake.

Then, again, the composition of the final party—four men of the officer class and one long-service naval seaman—is also open to criticism, and may have played its part in the breakdown of Seaman Evans, which took place with alarming rapidity once the main stimulus to his imagination was removed by the sight of the traces of Amundsen's party near the Pole. Dr. Simpson speaks of the party as struggling on the plateau on "insufficient" food. That the food was insufficient one feels inclined to doubt. All parties and food experts seem agreed as to its adequate content of energy value even for the stringent conditions of the plateau. The suitability of the ration for a trek of the length contemplated and accomplished is another matter. How far the failure of the final party was due to the general debility and lassitude which is one of the symptoms of incipient scurvy is a debatable point. Macklin, in his able summary of the occurrence of scurvy under Antarctic conditions, has attributed the loss of the party to this cause. Certainly the long duration and harsh conditions of the journey would go far to use up the reserves of antiscorbutic vitamine which normally serve to delay the incidence of scurvy for several months. Still, the pony-meat should have been a source of new supply, and the breakdown of E. R. G. R. Evans, who had been living on sledging rations and had been manhauling for some weeks longer than the members of the polar party, is not a reliable criterion from which to argue about the state of health of his companions. Wilson was an expert; knew the symptoms of scurvy from personal experience; was a conscientious and scientific observer, and does not suggest that visible signs of scurvy had appeared. Dr. Atkinson, the writer believes, was clear that this was not so. The case must be regarded as not proven, although the possibility needs to be borne in mind. Finally, there is the mysterious disappearance of the paraffin oil over which Scott is clearly preoccupied throughout the weeks of the return Barrier journey. All sorts of explanations have been advanced to account for this, ranging from the formation of an allotrope of tin in the solder of the tins under the influence of low temperatures and consequent leakage, to the shrinkage of the washers of the tins and consequent evaporation. We shall never probably know the truth. Only two things seem clear. Each returning party took, if anything, less than their share. Leakage did take place. At One Ton Depôt later in the year, portions of the food were found to be saturated with paraffin.

None of the above reasons nor—the writer believes—the weather were sufficient by themselves to bring about the tragedy. Combined and acting in concert they have served to convert a commonplace story of endeavour into one of the finest traditions of the age. They have enabled Scott's Last Expedition to stand forth almost alone among private polar ventures as a perfected enterprise with all its results adequately recorded. Further, by making possible the founding of a scientific Polar Research Institute at Cambridge University, they have gone far towards ensuring a similar survival for the more important results of the numerous expeditions yet to come before the exploration of the polar regions is complete and the era of "exploration" has definitely given place to that of "exploitation."

R. E. PRIESTLEY.

AN AGRICULTURAL ATLAS

An Agricultural Atlas of England and Wales.— Compiled by **J. Pryse Howell** on behalf of the Agricultural Economics Research Institute of the University of Oxford and published by the Ordnance Survey at Southampton. 1925. 22 + 4 *maps on scale* 1 : 1,500,000 *and Introduction.* 10*s. net.*

STUDENTS of geography, and many others, have long wished to obtain in a convenient form information as to agricultural distributions such as that given here. Published official statistics are issued only for the Administrative Counties—areas which are in general too large and varied to allow of any detailed comparison of the distributions of the crops and other products so listed with their conditions of relief or climate or populousness. In compiling the twenty-two distribution maps which form this atlas Mr. Howell worked from the Parish Returns and plotted his results on maps showing parish boundaries on a scale of ½ inch to 1 mile. That scale, and the extent of land (25 or 100 acres) or number of animals (100 or 500) represented by one dot, do not allow of precise allocation of crops or stock within a parish, except in very large ones. But the civil parish is the smallest unit area for which statistics are available, and on the scale of these maps variations within a parish will usually be inappreciable. Each map is accompanied by a corresponding table of statistics for the county areas.

The maps fall into four well-defined groups. The first three show the utilization of the land surface as (1) Mountain and Heath; (2) Permanent Grass; and (3) Arable Land. On each one dot represents 100 acres. There is no indication either on the maps or in the Introduction that other parts of the land surface than these three—*e.g.* woodland, built-on areas, waste, etc.—have been taken into account in any of the calculations.

The next eleven maps show the distribution of the chief crops of the arable land. Here each dot represents 25 acres; and the accompanying table states the proportion of the arable land in each county devoted to the particular crop. A similar map shows the bare fallow.

The last seven of these maps show the distribution of the chief domestic animals. Each dot represents 100 animals, except for sheep, whose much greater number allows only one dot for 500 animals; for in this country the number of sheep is nearly twice that of horses, cattle, and pigs together, and not much less than half that of the human population.

All these agricultural distribution maps are printed with black dots on a red outline of coast-line and county boundaries on a fairly transparent tracing paper, so that they may be superposed on any one of the four foundation maps which follow. These four are printed in colour on loose sheets of opaque white paper.

The first "basis" map is a generalized map of the "solid" geology which can, in many areas, be used to give some indication of the character of the soil and also, more often, of the subsoil. It is too general to be of much value for detailed study; but, in the absence of any good soil maps or of a complete "drift" map, it is perhaps the best thing possible at present. It would have been possible to show much more detail without loss of clearness. The second (orographic) basis map shows altitudes by layer colours which change at the 200-feet, 600-feet, 1200-feet, and 2000-feet contours. The third is a similarly generalized map of mean annual rainfall. These three maps will serve their purpose of giving a reasonably correct indication of the association of par-

ticular crops or types of farming with the facts they show; and the student who requires more detail must consult maps on a larger scale.

The fourth basis map is one "showing the locality of certain Market Towns, etc." The Introduction states "No attempt has been made to provide a chart of economic conditions, but the map showing the situation of market towns indicates in some measure the localities in which the chief part of the urban population is to be found." This map employs a circle, in red or black, as its town symbol. There is no indication of the difference of meaning intended by the two colours; examination shows that in England most of the county towns and many county boroughs are marked by black circles and most smaller towns by red ones. But in Wales several small non-county towns are shown by black circles. In at least four cases, however—Beverley, Merthyr Tydfil, Newport (I.W.), and Presteigne—both colours are printed. In the industrial areas of West Yorkshire and South Lancashire many town symbols have been inserted without names, and not all of them are market towns. But in the Black Country and South Wales and on Tyneside there are relatively fewer town symbols; so that on comparison these areas appear to be less populous than they are in fact. This map seems to attempt too much, and in doing so it fails to give much information of value. Markets might be usefully classified as (*a*) consuming markets and (*b*) collecting markets, and, though in practice it is difficult to distinguish marginal cases, it is clear that the large populous urban regions are primarily consuming markets for agricultural produce, while the small rural market towns are mainly engaged in collecting that produce and forwarding it to the greater consuming markets. For a study of the effects of accessibility of the markets and market requirements on agricultural production the consuming areas are the important markets, roughly in proportion to their consuming power, and they could be shown very much better by a map showing density of population than by that given here. Possibly consuming centres and rural markets would be best shown on separate maps: certainly this attempt to combine them is not a success.

Space does not allow us to comment on each map. Their value is in that they show more vividly and precisely relationships which are, at least in general terms, familiar to students of the geography of England. The association of hill-pasture and heath with the high and rainy areas of the North and West and with the Tertiary gravels and sands of the South and East is clearly shown. So also is the marked concentration of some crops, *e.g.* of potatoes grown for sale in the Fenlands about the Wash and the Humber and on the Lancashire and Cheshire plain, and the wide diffusion of other types of farming, as *e.g.* dairy work. And comparisons among these maps demonstrate many interesting facts, such as the apparent association of pigs and milch cows, and suggests many questions.

One very serious drawback to the atlas is the fact that all its data are for the year 1918, which was very far from being a normal year; and to some extent it may be regarded as a record of some results of the War. To fix on a normal year for all crops would be difficult, and hence we might expect better results from using average records over a period of years; though to do so would add very considerably to the work of compilation. It is also to be borne in mind that the data were collected in summer, and therefore the maps do not show any of the seasonal changes in distribution of cattle and sheep which are considerable in some areas, as, for instance, on the arable lands of the East Riding of York, where store cattle from the west, or from Ireland and Scotland, are purchased in autumn to consume the fodder crops

and provide manure before being sold as beef cattle in the winter and spring.

Part of the material used here was published in 1921 as 'The Agricultural Atlas of Wales.' It is a matter for congratulation that the success of that atlas has been sufficient to lead to this one. And we trust that there is a sufficient public for this to make possible further developments of the kind. The style of the base maps, with their ugly typed names, is not up to the high standard usually associated with the work of the Ordnance Survey, but was doubtless dictated by economy, and the price charged for the atlas is remarkably low. Mr. Howell, the Oxford Research Institute, and the Ministry of Agriculture are to be congratulated on having made a distinct contribution to our knowledge of England. **C. B. F.**

U-SHAPED MOUNTAIN AND FOLD LINE

The Unstable Middle Section of the Island Arcs.— W. H. Hobbs. Verh. v. Geol.-Mijnb. Gen. v. Ned. en Kol. Geol. Ser. VIII., pp. 219–262. *Four Plates.*

THE curved course of fold-mountains and island festoons is one of their most characteristic features. According to Suess the direction of these lines is sometimes reversed by a sudden bend like a hair-pin, and the middle of such an arc may be fractured into widely spaced islands. Professor Hobbs has discussed some of these bent and fragmentary island chains, and attributes their features to the instability of the middle section of the arc. He considers especially the arcs of the Sunda line, the Andaman-Nicobar Islands, the Moluccas, the West Indies, and the mountain arc of Iberia and Mauritania. Sharply bent mountain lines are frequent and easily explained; for they may be the worn jagged rim of narrow sunklands. There are serious mechanical difficulties in the explanation of U-shaped mountain lines by thrusting outward from the foundered block below the included basin. The sinking mass would doubtless cause an outward deep-seated pressure by displacing the material below it and thus uplifting its edge; but in such cases the folding at the surface would naturally be toward the basin. The down-faulting of a block after the folds have become rigid might cause a deep basin without any marginal folding; but outward folding appears improbable.

Hook-shaped island arcs to which Suess directed special attention are the Caribbean Arc of the West Indies, South Georgia in the South Atlantic, and the Moluccas, and as a corresponding type of mountain chain, those of Southern Spain and Morocco, and of Assam. Before consideration of the mechanical processes involved in such overthrust outfolds it is advisable to inquire whether the evidence for them is convincing, or whether the structures thus interpreted may have been produced by subsidence within a folded belt, and not by folding outward from the sunken block.

In the case of the arc of the Caribbees or Lesser Antilles, the best evidence available is from Barbados. The base of that island is intensely folded; and if it were folded according to the hypothesis by pressure normal to the Caribbean Arc the folds in Barbados should trend from north to south. The folding, though subject to many local irregularities, is predominantly along lines from west to east, and due to pressure from the south. Professor Hobbs figures one fold which he attributed to pressure from the west; it may be only a local

variation from the main strike that is recorded in the map by Jukes-Brown and Harrison. The basement rocks of Barbados * appear to be fragments of an intensely folded mountain line, parallel to those in Trinidad and Venezuela, which once ranged from the Caribbean eastward into the Atlantic. It was due to the folding which also produced the mountains of Venezuela and the Atlas Mountains of Africa. Its direction is quite inconsistent with an arc folded from the west. Prof. Hobbs criticizes some American authors including A. Agassiz, Vaughan, and Taber, as under-rating the importance of the arc-folds; but the evidence supports the view of Taber that the great Caribbean depressions are due to subsidences along east-to-west faults, and shows that the Caribbean Deep is not bounded to the east by a north-and-south fold. There is doubtless a north-to-south fracture along the Caribbean arc, but no adequate evidence of a fold line.

Professor Hobbs also describes the Curaçoa–Bonaire arclet, in which the evidence is consistent with its having been folded as part of an east-to-west Antillean Mountain system.

The second of the chief Atlantic U-arcs described by Suess is that of South Georgia, which he regards as similar to the Caribbean Arc from the southern end of the Andes. In spite of the evidence collected by Mr. David Ferguson there is still great uncertainty as to the essential structure of South Georgia; but from the age of its rocks, including Ordovician, Trias, and Cretaceous, and the nature of its igneous rocks, it appears to be a fragment of an ancient South Atlantic land, and not part of an eastward bend of the Andes (*Trans. R. Soc. Edin.*, **51**, 1916, pp. 495–587; and *Geol. Mag.*, 1914, pp. 53–64).

The Eastern Archipelago includes three great arcs. The main western arc is that of Sunda, on which Professor Hobbs made valuable observations during his cruise in the U.S.S. *Bittern*, including striking evidence of recent great changes in level. In the Sunda Arc the folded sedimentary rocks are on the southern side, and the main line along the arc is volcanic; it has a normal crescentic course which is broken by cross fractures comparable to those in the Alps and the Caucasus. The Sunda Arc is continued northward by the Nicobar and Andaman Islands, which also form an open arc; as shown by Tipper, it was folded during the Oligocene by pressure toward the west. In the eastern part of the Eastern Archipelago the Moluccan Arc, of which the knowledge is mainly due to Molengraaff and Brouwer, is of special interest from its resemblance to the Caribbean Arc, having a volcanic line bounding the basin within, and folded sedimentary rocks forming the outer margin. Though Professors Hobbs and Brouwer agree that the line is a U-shaped mountain fold, they differ as to the direction of the pressure. According to Professor Brouwer the pressure was outward from the foundered block, while Professor Hobbs regards it as having been inward. The writer discussed this question in connection with some fresh material from the Aru Islands (*Geogr. Journ.*, vol. **61**, 1923, pp. 20–31; and *Geol. Mag.*, vol. **60**, 1924, pp. 52–72), and pointed out that, so far as the evidence goes, instead of the folds in them being north and south along the arc, they lie east and west across it. Those islands appear to be a fragment of land folded by pressure acting meridionally, and not from the west. There is no adequate evidence that the eastern rim of the Banda subsidence is a fold-line.

The chief mountain U-fold attributed to the interior of a continent is the

* The author attributes to Rutten the discovery of the Radiolarian beds in Cuba; but they were described in 1895 with a list of species also found in Barbados (*Q.J.C.S.* **51**, pp. 293–5).

supposed return of the Himalaya westward through Southern Assam into Burma. The evidence obtained in recent years as to the structure of Assam, and as to the eastward continuation of the Himalaya in Chinese Tibet, has disproved the bending back of the main Himalayan line through northern into Western Burma.

Another U-shaped arc claimed by Professor Hobbs is that of Southern Spain and Northern Morocco, which was called by Suess the Betic Cordillera. He supports its existence by the sonic soundings of the U.S.S. *Stewart*, which show extraordinary irregularities in the sea-floor west of Gibraltar. Professor Hobbs justly calls this area " restless," but the soundings are inadequate to prove the lines suggested, for the facts are consistent with a westward extension of the Spanish valleys and sierras. A few more lines of soundings in this area would settle this interesting question.

In his description of the various crescentic folds Professor Hobbs calls attention to their varying relation to the fore-deeps and the back-deeps, to the volcanic lines connected with them, and to the different types of lava erupted from different positions in the arc. Hence, though the continuity of the fold arcs in the U-bends adopted by Suess and in this memoir is doubtful, Professor Hobbs has helped to elucidate an important physiographic problem by his classification of the elements in some of the great island arcs, by his full records of the literature, and, as usual in his writings, by his clear and logical terminology.

J. W. GREGORY.

REVIEWS

EUROPE

Prehistoric London : Its Mounds and Circles.— E. O. Gordon. London : The Covenant Publishing Co. 1925. 8½ × 5½, pp. x. + 212. *Plan and Illustrations.* *7s. 6d. net.*

THIS bewildering pot-pourri of Keltic traditions deals but little with the subject of the title, which is the antiquity and astronomical and political uses of the White Mound of the Tower of London, Penton, Parliament Hill, the Primrose Hill burrows, and Tothill (Westminster). Mounds and circles, Druidism, prehistoric places of national assembly (Gorsedds), the Kinship of Trojans and Britons, the origin of the Broad Arrow, terra-cotta whorls from Hissarlik, etc., etc.—all this and much more the author attempts to weave together in his amazing 178 pages. He depends much on etymologies, but his accuracy may be gauged from his statement that " cemetery " is a Hebrew word, and from his Latin quotations *Treveri statet* (p. 102) and *ad instar magna Troje* (p. 107). He relies on the Welsh Triads, with their foolish system of recording facts which might be associated in the mind. He knows far more facts about the Druids than Cæsar, and so on. But the crowning mistake of this book is that its author rakes out etymologies from all eras and climates, and makes faint resemblances of sound the basis of astounding inferences. He seems to forget that any two copious languages can furnish copious lists of parallels, and that lists of parallel, but unconnected, facts are easy to make, seeing that all men, *qua* men, resemble one another in nature and tendency, especially in transmitted usage. To establish thus the theories that the Magi were the Druids, the Druids Hindus, and the British Trojans, requires the dangerous equipment of a little learning, the absence of critical faculty, and very little

acuteness. The author disports himself in these pastures, and establishes *prima facie* to his own satisfaction almost any wild idea he wishes. A quaint recrudescence of Keltic extravagance. S. E. W.

A Wayfarer in Provence.— E. I. Robson. London: Methuen & Co., Ltd. 1926. 7½ × 5, pp. 246. *Twelve Illustrations by J. R. E. Howard, and a Map.* 7*s.* 6*d. net.*

We are told on the paper cover of this book that the purpose of the work is to stimulate rather than to satisfy the traveller. It is certainly no substitute for Baedeker or Joanne, being in some ways irritatingly scrappy and incomplete. There are too many remarks like "Notre Dame des Doms is a very magnificent building" and "From Arles one naturally goes to see the fine ruin of Montmajour," with no indication as to what in these buildings is magnificent or fine. Indeed, although the author devotes a special chapter to the Roman remains, unnecessarily separating the description of these from the general itinerary, he neglects the Romanesque architecture and its Provençal characteristics almost entirely. It is true that he gives some account of the remarkable façade at S. Gilles; but he does not emphasize the peculiar Provençal feature of the frieze, here and at Tarascon and at S. Trophime at Arles. The latter church is not described at all. Does the author find nothing stimulating in the vivid contrasts of light and shade made by the Provençal sun in the lovely cloisters of S. Trophime and Montmajour? It is strange, too, that he can speak of Tarascon without mention of its great castle dominating the Rhône; and he seems, both from text and map, to be totally unaware of S. Maximin, where the church is described by Augustus Hare as internally far the finest Gothic building in Provence.

The author is really more interested in people than in things—in the doings of Caius Marius and Good King René, in the poems of Mistral and the Provençal legends, in the pastorales of the villages and the mild bull-fights of the towns, and, quite justifiably, in the virtues of the local wines and farmhouse cooking. These are all, no doubt, part and parcel of the fascinating Provençal atmosphere and well calculated to stimulate the traveller; but, for a description of the Pont du Gard, for instance, a book like Henry James's 'Little Tour in France' would probably be found more satisfying.

The illustrator is happiest in drawings of arched streets. The sketch-map is poor. J. H. R.

Von der Pyrenäen zum Nil.— Prof. Dr. M. Rikli. Bern und Leipzig: Verlag Ernst Bircher. 1926. 9½ × 6½, pp. xii. + 566. *Coloured Plates and Illustrations from Photographs. Mk.* 14.40.

Twenty years ago Prof. Rikli, of Zurich, initiated there a scheme of long-distance scientific excursions for advanced students in connection with his botanical courses. The excursions were for the most part to the lands surrounding the Mediterranean Sea, or to the islands within it (particularly Corsica, Sicily, and Crete). As the years went on they not only took their leader further and further afield, but came to include representatives, both Swiss and foreign, of many different sciences and interests. The material collected formed naturally the basis of a number of publications, and the more technical results are already familiar to students of botanical geography, but much of the material had not been made generally available. The book is a response to a desire that the scattered essays dealing with the more general aspects should be brought together in one volume. Its wealth of beautiful and

appropriate illustrations, coupled with the author's enthusiasm for his subject, give it great attractiveness, and it is likely to appeal both to the general reader and to the geographer.

The individual essays vary greatly both in scope and treatment, and do not cover all the ground between the limits mentioned in the title. Italy is represented by a series of essays contributed by Pffarrer K. Linder, devoted chiefly to Sicily but including also the region round Naples. The Atlas Lands are discussed only in an account of a spring journey from Oran to Colomb Bechar by Prof. Rikli, while Egypt forms the subject of a somewhat lengthy section contributed by Dr. H. Weilenmann, of which a considerable part is devoted to recent history and politics. Some of the chapters, particularly those dealing with Sicily and Naples, are more or less of the guide-book type, and some will be disposed to regret that Prof. Rikli did not omit descriptions of well-known, and often-described places, and thus leave more room for chapters on general Mediterranean problems.

Of the latter, however, there are several of great interest. A charming one is that on lines of access to the Mediterranean lands, which discusses the often sudden changes in the nature of the vegetation at critical points on road or rail. The author regards as one of the most striking of these "gates of the south," the tunnel on the road through the Val Bregaglia, near the village of Promontogno. This separates the larch and Cembran pine woods above from the groves of sweet chestnut below, the change in the dominant trees being accompanied by a corresponding change in the characters of the undergrowth.

Among other delightful chapters are those dealing respectively with "Corsica, the land of Maquis," and with "Valais, the Swiss Spain." Prof. Rikli has visited Corsica several times, and is well acquainted with the canton Valais. In both cases, therefore, the treatment rises definitely above the level of mere description to a reasoned account of the sum-total of the conditions, and so becomes in the true sense geographical. It is pointed out that despite the extent to which the Valais is visited by tourists, both Swiss and foreign, in summer, for most people the main valley is almost unknown territory, Its "steppe" character, which gives it so much geographical interest, means that neither in summer nor in winter has it any obvious attractions for the ordinary visitor, who makes haste to leave it for the lateral valleys with their snow-clad peaks and glaciers. These valleys again are redeemed from the barrenness of the karst-lands of the Dinaric Alps, or of the deforested mountain valleys of Dauphiny, only by the irrigation channels fed by the eternal snows. Next to the dust and glare of the main valley probably most tourists regard as its most dreary feature the endless vineyards of the lower slopes. The vines themselves—ugly and stunted compared with the graceful luxuriance of those of the Italian side of the Alps, and planted in stony, barren-looking ground—offer no relief to the eye, which welcomes with gratitude the dark firwoods above. But Prof. Rikli shows how every peculiarity of these vineyards represents an adjustment to the local conditions—even the stones are brought by the husbandmen, and part of the stunted appearance is due to the deep planting practised, itself a protection against wind. Apart from the prevailing drought the "Spanish" character of the area is emphasized by the nature of the fruit trees, which include pomegranates. This tree, and also the almond and the fig, grow wild in certain parts, though they may be only escapes from cultivation. The isolated nature of the canton is emphasized by the persistence there of cultivated plants unknown or hardly known elsewhere in Switzerland. Among

these is the saffron crocus, and in parts of the canton it is still the custom to have the dishes at a wedding feast flavoured with saffron.

These notes may serve to indicate the character of the contents of the book. It is one whose leaves it is delightful to turn over, for almost everywhere one is assured of finding beautiful illustrations, and charming little fragments of description. We hope, however, that Prof. Rikli will one day supplement it by writing a book on a different plan, which shall bring together under subject rather than topographical headings the results of his extensive journeys round the Mediterranean. M. I. N.

The Economic Development of Russia, 1905–1914, with special reference to Trade, Industry, and Finance.— Margaret Millar. London: P. S. King & Son. 1926. $8\frac{1}{4} \times 5\frac{1}{2}$, pp. 307. *Two Maps.* 12*s.* 6*d. net.*

This survey of the economic development of Russia during the decade preceding the Great European War has been undertaken by the author in the belief that the economic problems then apparent were essentially the same as those confronting the Soviet *régime ;* and that it is possible to view the present position in true perspective only through a study of the immediate past. The book, further, aims at presenting an account based directly on accredited economic and historic data in contrast to the " impressionistic " accounts that are usual. And it is immediately obvious that this volume is the result of detailed and serious research.

After an introductory chapter on the geography of the area and the sociological basis of economic development, the author deals successively with the trade, finance, ways of communication, and industry of the country. One could wish that the preliminary geographical account had received more attention ; compressed as it is into four pages it is necessarily incomplete, and in view of the indisputable importance of the " geography " of, *e.g.*, the Black Earth Belt in the economic history, the elementary account given seems quite inadequate. This section—and each other in turn—is supplemented by various statistical tables. These tables have been collected from a great variety of sources and are valuable, making readily available facts that cannot easily be obtained elsewhere. But it is, surely, an unnecessary interruption to the continuity of the text to insert them in this way. They would be at least as well placed for reference if they were collected at the end of the book.

Throughout the main sections of the work the author shows the predominant influence of the State in each department of economic activity, and studies the " conflicts " such influence involved and the disadvantages that ensued. She demonstrates how Russia's favourable balance of trade was secured only at the expense of the population, with resultant limitation of the home market and restriction of industry, and traces the completeness of the State control of the finances of the country, and the effects of their effort to graft a modern system of finance on a country at a backward stage of economic development. " The Government was twentieth century in its economic aspirations : but these aspirations had to be grafted on to political structure which approximated more nearly to the sixteenth century. . . ." The sections on Communications and Industry give an historical outline of the development of means of communication and the growth of industries, and shows again how certain industries were really subsidized at the expense of the people in general.

The volume as a whole makes interesting reading ; even though the reader may not agree with some of the author's conclusions he cannot fail to appreciate the variety of matter introduced in the text and tables, the careful way in which

this is handled, and, one might add, the courage needed to attempt the compression of a work dealing with so many important subjects into very small space. B. H.

ASIA

The Mammoth and Mammoth Hunting in North-East Siberia.— B. Digby. London: H. F. and G. Witherby. 1926. 9 × 5½, pp. 224. *Illustrations and Map.* 12*s.* 6*d. net.*

A book on the mammoth has an interest since most that has been written previously on this animal is hidden in German and Russian periodicals and books of travel not always easy of access. Mr. Digby has taken pains to trace records of various finds in Siberia, and his book is a fairly complete compilation on the subject, but it would have been improved by a less colloquial style of writing and better arrangement of the material. He journeyed down the Lena river himself in search of mammoth, but was not fortunate enough to see one, though he had the opportunity of examining a great collection of tusks. On a map he has marked the position of twenty finds of flesh-and-blood mammoths (cold-storage specimens, as he calls them) and several woolly rhinoceros. The mammoth finds date from 1707 to 1912, and range from Taimir and the New Siberian Islands southwards to the Vilui river, with one occurrence in Southern Siberia, near Nijni Udinsk. In other words, they are confined more or less to the tundra and the straggling pine forests that project northwards along the river basins. This may have been his habitat, or more likely the lack of remains further south may be due to decay in warmer conditions, for he certainly lived in Europe and North America. In any case his preservation in so many finds in a sparsely peopled land is a mystery, as also are the huge deposits of tusks in the New Siberian Islands. There are several illustrations of mammoths, tusks, and prehistoric cave drawings of mammoths from France. R. N. R. B.

An Adventurous Journey.— Mrs. Alec Tweedie. London: Hutchinson & Co. N.D. 9¼ × 6, pp. viii. + 398. *Illustrations, some from Water-Colour Sketches.* 24*s. net.*

The title of Mrs. Tweedie's book is no exaggeration. In April 1925 she travelled from Moscow across Siberia to China, where she arrived in the thick of the anti-foreign agitation, while before she left a new civil war had begun. Mrs. Tweedie is always emphatic in her opinions, and she gives her impressions of Russia as she saw it with no uncertain voice. Since her first chapter on Moscow is entitled "Hell," the rest may well be surmised. Certainly her journey by the now decrepit Trans-Siberian Railway was anything but a pleasure trip, apart from a railway accident that proved fatal to many of the passengers. Her fleeting impressions of Soviet territories are of interest, especially when it is remembered that she was not on one of those officially conducted tours which have been common of late years. But the chapters on China are of more value. Mrs. Tweedie has an eye for small things, besides an accuracy in facts which makes her word-pictures of Chinese life most vivid. She visited Peking, the Great Wall, Shanghai, and Hong Kong, and has something to say of them all, nothing new no doubt, but in all cases something that brings Chinese life near to the reader. The book is diffuse in places, and the jerky, staccato style annoys occasionally, but there are no dull patches, and never any lack of human interest. The politics with which the pages are liberally strewn become predominant in the last two chapters, which are occupied with gloomy forebodings of the years to come. These are, no doubt,

Mrs. Tweedie's considered opinions, and will probably be shared by many, but they would not have been less effective if they had been stated more concisely. The track chart at the beginning of the book does not seem to be of much value or wholly relevant to the volume, but the black-and-white illustrations and water-colour reproductions are good. The lack of any index is a bad defect, and so is the publisher's neglect to give a date to the book

R. N. R. B.

Malay Land. "Tanah Malayu." Some Phases of Life in British Malaya.— R. J. H. Sidney. London: Cecil Palmer. 1926. 9 × 5¾, pp. 300. *Photographs and Line Drawings.* 15*s. net.*

When compared with the number of books on Papua, the literature of British Malaya is very small, and for that reason alone Mr. R. J. H. Sidney's work is welcome. It would be unfair to criticize it for not being what it does not pretend to be: for Mr. Sidney's aim is unpretentious, and he has not attempted to produce a standard work. He has not seen fit even to give his readers any details of geography, nor yet to sketch the history of how Malaya came under British rule; he is not concerned with its pagan tribes; he makes no mention of politics or trade. His object has been to set out, in a series of sketches, some phases of everyday life as it is lived by the Europeans, Malays, and Chinese that go to make up the population of British Malaya. This he does very well, though at times he is unnecessarily discursive. He is by no means comprehensive, but, while apologizing for the omissions of any reference to such important subjects as tin, coconuts, and malaria, he promises to complete his picture of Malayan life with "another book on similar lines."

There may be readers who will wish that, instead of promising them jam to-morrow, Mr. Sidney had given them more jam to-day, as he might have done by a little judicious pruning and the exclusion of irrelevancies—such as a three-page description of the Salonika fire. Nevertheless, as the book stands, it contains much useful information and many charming descriptions. In fact, Mr. Sidney tells the intending visitor to Malaya exactly what he may expect to find. In a pleasant, easy style he discourses on bungalows, native servants, rest-houses, railways, motoring, Chinese theatres, and Malay ceremonies, and devotes two chapters to some admirable impressions of Singapore. The book is well illustrated with numerous photographs and with some effective line drawings by a Chinese artist. One may be allowed to hope that the next volume will be provided with an index and a map.

O. R.

The Vegetation of Burma from an Ecological Standpoint.— L. Dudley Stamp. Calcutta: Thacker, Spink & Co. 1925. 10 × 8, pp. vi. + 65. *Sketch-maps and Illustrations.*

In the present work Dr. Stamp has correlated the information contained in his various papers on the vegetation of parts of Burma, and, with assistance given him by officers of the Indian Forest Service in Burma, has been able to present the first general review of the vegetation of Burma from a present-day ecological standpoint. In a brief introduction he mentions earlier works on this subject, and emphasizes the sources from which his information has been drawn. The factors governing the distribution of vegetation he discusses under the headings of Elevation, Climate, and Geology and Soil. Elevation he divides into three zones: land above 3000 feet, land below 3000 feet, and tidal areas which include the Irrawaddy delta, part of the Mergui Archipelago, and South Arakan. Rainfall is considered to be the determining climatic factor, the isohyets of 40 inches and 80 inches providing the divisions of the

Dry Belt, the Monsoon Forests, and the Evergreen Forests. In the discussion on Geology and Soil it is pointed out that climate and soil in Burma tend to counteract one another, and the same formations of vegetation are inclined to reappear on different soils under different climatic conditions. The soil on the whole indicates the local distribution both of forest types and of species.

The Vegetation Types are grouped under Mountain Vegetation (3000 feet and above) with six divisions, and Lowland Vegetation (below 3000 feet) with twenty-five divisions. Four seral communities are also mentioned. A chapter on the geology with its special significance for forestry in Burma, and a bibliography, complete the treatise.

The book is profusely illustrated with photographs and outline maps. The excellent aerial photographs especially are of considerable value in the discussion on the tidal areas. The work will be welcomed as a general review, and will provide a starting-point for more detailed research into the structure and development of the vegetation of Burma. T. F. C.

AFRICA

Digging for Lost African Gods : The Record of Five Years' Archæological Excavation in North Africa.— Byron Khun de Prorok. New York and London : G. P. Putnam's Sons. 1926. 9½ × 6½, pp. xvi. + 369. *Map and Illustrations.* 25*s. net.*

As the author truly says (p. 36), " the germ of enthusiasm is virulent " ; it devastates spelling, scholarship, historical perspective impartially, and infects the reader too with a delirious inconsequence, the nightmare feeling that it doesn't much matter what happens next. " We are never educated in self-restraint " (p. 296), another odd confession from a would-be excavator of what, if it could only be found, might be one of the most important sites in the world. It is almost incredible, in view of the results, that this expedition's photographer actually " spent a fortnight of intensive training in Paris preparatory to this task " (p. 40) ; but perhaps this was necessary, for his duties included spying on thievish tourists and forcing the pace of Arab labourers by showing them themselves at work, accelerated in projection. But, given enthusiasm, and apparently boundless funds, work can at all events be done rapidly that is not done at all under more normal conditions. Large sections of Roman Carthage have been opened up ; a large quantity of *débris* has been shot into the sea irretrievably (p. 70) ; a boom in real estate has been anticipated (and probably accelerated), which is likely to seal down what is left of Carthage under a fresh layer of constructions ; aviators have detected submarine constructions off-shore ; divers have verified native accounts of a " submerged city " near Gerba ; a raid in powerful cars has reached In-salah, opened a mausoleum, and returned without untoward incident ; and Count de Prorok and his friends have been " rushed " round the Roman remains in French Africa with much courteous help from French scholars and officials. What they have actually found it is almost impossible to discover from this ingenious but tiresome book ; or what the connection is between the author's " archæological excavations " and the careful, patient labours, over many years, of experts such as Père Delattre at Carthage, and the regular staff of the French " Service des Antiquités." J. L. M.

AMERICA

On the Roof of the Rockies.— Lewis R. Freeman. London: William Heineman, Ltd. 1926. 9½ × 6, pp. xiv. + 270. *Illustrations.* 25*s. net.*

Mr. Freeman's account of a journey from Banff through the Rockies to the Columbia Icefield for the purpose of securing cinematograph films of natural scenery, apart from being entertaining in itself, raises at least one point of interest. He rightly disdains the methods employed by the ordinary film producer to secure faked "stunts": yet, curiously enough, in his chapter, "Behind the Scenes of Scenics," he candidly displays the procedure of this expedition, in which very similar means were at times employed. It is only natural that swollen rivers should be forded and re-forded at dangerous spots because it will "Look better for movie," but the production, for instance, of avalanches by exploding sticks of dynamite, apart from recklessness, is on a level with the mere cinema stunt. Every one will agree with the writer on the value of films of natural beauties, and even on the need for improvement in their presentation, but such methods, if developed, will remove half their value at once. Many of the illustrations to this book themselves show how unnecessary are such efforts to stimulate nature. Among the achievements of the party were the filming of a panorama of the Columbia icefield from Mount Castleguard, the crossing of the icefield and the descent of the Saskatchewan with pack-horses. Mr. Freeman has related their experiences with humour and insight into the ways of men and animals. He is evidently a lover of dogs, and is also glad to be able to record that on the conclusion of their arduous journey "not one horse had been lost; not one had been permanently lamed."

Porto Rico, History and Conditions.— Knowlton Mixer. New York: The Macmillan Company. 1926. 9 × 6, pp. xx. + 330. *Illustrations.* 17*s. net.*

Those who seek an acquaintance with present-day Porto Rico will find this volume a useful aid, although its value as a dispassionate survey of conditions is to a certain extent discounted by the author's use of his pages for the dissemination of propaganda in favour of United States' control of the Caribbean.

Mr. Mixer's style is easy, and his chapters dealing with the early history of the island are readable if a trifle sketchy; later sections deal with American political control, and with the cultivation of such Porto Rican products as sugar-cane, fruits, coffee, tobacco, cotton and edible roots. When he speaks of social problems it is plain that conditions on this tropic island leave much room for improvement, and that neither content nor orderliness have kept pace with the advance in, for instance, foreign commerce; while public health gives cause for anxiety, and crime is widespread. Perhaps the most interesting chapter of the handbook is that dealing with the "jibaro," the native Porto Rican mixture of Spaniard and Indian, the soundest stock on the island.

The illustrations are good and abundant, and there is a fair map.

L. E. E.

Economic Geography of South America.— R. H. Whitbeck. London: McGraw-Hill Publishing Company. 1926. 9 × 6, pp. viii. + 430. *Illustrations.* 17*s.* 6*d. net.*

This volume is an expansion of a series of lectures given by the author at Wisconsin University, and is a hasty generalizing survey of topographical and trade conditions, almost exclusively with reference to United States' sales of

goods. Mr. Whitbeck is said to have paid a visit to " parts of " six of the seventeen South American countries, and as a result has been able to come to conclusions upon almost every subject connected with commerce. Type and printing are better than the average of this kind of statistical handbook ; but the illustrations are second-hand and poor, while the statistics, referring chiefly to United States' business, are out of date. L. E. E.

AUSTRALASIA AND PACIFIC ISLANDS

A Historical Geography of the British Dominions. Vol. VI. Australia.— J. D. Rogers. Second edition, revised and enlarged by **R. N. Kershaw.** Oxford : Clarendon Press. 1925. 7½ × 5, pp. viii. + 382. *Maps.* 7*s.* 6*d. net.*

The first edition of this concise history of Australasia which was published in 1907 naturally made Australian federation its concluding point. To this second edition Mr. Kershaw has added a sketch of the history of Australia, New Zealand, and the Pacific from 1900 to the outbreak of the late war, and a chapter on Australasia during and after the war, making also such revision and correction of Mr. Rogers' text as seemed necessary. Mr. Kershaw has shown a due sense of proportion in his additions, and has compressed a large variety of topics into a clear and straightforward narrative which enhances the usefulness of the work, though it cannot be said that Mr. Rogers' book, in spite of its flashes of insight and interpretative quality, was ever very easy reading. E. A. B.

MATHEMATICAL AND PHYSICAL GEOGRAPHY

Traité de Géographie Physique.— Emm. de Martonne. Quatrième Edition entièrement refondue. Tome I. Notions Générales—Climat—Hydrographie. Tome II. Le Relief du Sol. Paris : Librarie Armand Colin. 1925. 10 × 6½, pp. xii. + 1057. *Four hundred Figures and Maps, fifty-two Plates.*

The first edition of this monumental work appeared some twenty years ago. That a fourth edition has appeared is in itself a testimony of its excellence.

The new edition has been very considerably enlarged and, for the most part, re-written. The least altered chapters are those in volume **1** : Notions générales. The author in his preface says, " La Géographie physique reste pour une science d'observation et de raisonnement, une science naturelle ; nous laissons à d'autres le soin de devélopper les questions mathématiques ou purement physiques, que ne sont traitées que comme notions auxiliares." The remaining parts of the two volumes have been completely overhauled and brought up to date. This is especially so in volume **2**. The third edition devoted about 340 pages to Geomorphology ; the present edition about 530.

Although there is so much new matter the general structure of the new edition is the same as in the third edition. The chapters may vary a little in title, but contain much the same material. In some cases duplication of chapters has been made. Also the number of figures and plates has been increased considerably.

To describe the work again in detail would be a task of supererogation, as it is so well known to English readers. But as the second volume is almost a new book it may be useful to indicate some of the more important alterations and additions. The chapters dealing with the Cycle of Erosion and the Influence of Structure on Scenery are now very much fuller—particularly so in the

case of Limestone areas. The chapter on Tectonics has been rearranged in the light of Argand's work on the Alps. Staub's 'Bau der Alpen' was apparently published too late to be considered. The chapters on Ice and Coasts have been duplicated, and we note references to the recent publications of D. W. Johnson on Shorelines and W. M. Davis on Coral Islands.

In speaking of such a comprehensive work, few points can be touched upon, but it should be noted that the author has enriched the volumes with additional and up-to-date references in every section—to Bjerknes' Theory of Cyclones, to Eliot's work on the Climate of India and his views on the causes of the September–December Rainfall around Madras, to Argand and Heine's work on the Alps, and to many other authorities. In fact, the Bibliographies at the end of each chapter are one of the best features of the work. Unlike many foreign books, it gives references to publications in many languages besides French. The student cannot do better than consult these bibliographies to obtain literature on any point about which he desires information.

The volumes are admirably produced: printing and paper are good, and the plates excellent. The third and final volume on Biogéographie is to appear shortly. With it will be the index. The present volumes contain full lists of figures and plates and a detailed analysis of the chapters. There is no doubt that the division into three volumes is a considerable advantage: each is complete in itself and of a convenient size. J. A. S.

HUMAN AND HISTORICAL GEOGRAPHY

The Soil and Civilization.— M. Whitney. London: Chapman & Hall. 1926. 8½ × 6, pp. x. + 278. *Sketch-map and Illustrations.* 15*s. net.*

Sir Archibald Geikie defined geography as a description of the Earth as the dwelling-place of man. The Earth thus envisaged as man's environment includes its fauna and vegetation, on which his very existence depends. But these ultimately depend upon the soil, and so it might be argued there is no more important geographical topic than the soil of the Earth. Regarding human civilization in all its developments and ramifications, the means by which it has grown and spread owe their first importance to the products of the soil. What these products are to be depends on the nature and treatment of the soil. In the treatment of the soil man's intelligence is a prime factor. We are here presented with a striking example of the interaction of mind and matter. But that mind may act effectually on matter it is essential that the nature characteristics and constitution of matter should be thoroughly understood. Now, although the use and importance of the soil has naturally been recognized ever since the beginnings of agriculture, it is only in quite recent years, since, indeed, the modern developments of chemical and biological science, that the soil has been scientifically investigated, and its complex composition revealed. This book sets out to show what light recent scientific knowledge and experiment have thrown on this important subject.

Man's most important foods—cereals, vegetables and fruits—depend directly upon the soil. From it they obtain constituent elements necessary for their growth and development. What is their relation in this respect to the soil in which they grow? Certain plants grow and flourish better in one soil than in another, in the same soil under one condition than another. Why is this? If man can discover the reasons he may be able to control in increasing measure and variety the growth of the food on which he depends. Is the growth of the plant simply dependent on the chemical constitution of the soil, that it should contain the elements entering into the composition of the plant?

Or is there something more than this? Is the soil the seat of changes and processes of a vital nature which profoundly affect the absorptive powers of the plant? Modern study of, and experimentation with, the soil have shown that taking a broad and comprehensive view the soil is truly a living thing, that it has complicated functional activities that react on one another, and affect its productive power in the growth of plants. It is certainly not inert matter, it is not mere dirt! A man realizing this and utilizing his knowledge is in a better position to handle the soil than one without it. He will be in a better position, for example, to understand such questions as the rotation of crops and the use of fertilizers. These are none of them the simple things we have hitherto thought, but methods of controlling the functional activities of a very complex machine which is used for the production of food and clothing for mankind. Such, in outline, is the author's thesis. He writes in a clear and interesting way, and though his analogy of the soil to the animal body may appear at times a little far-fetched, in applying the terms skeleton, digestion, respiration and circulation to the soil he is able to explain and enforce our daily increasing knowledge of the true nature of the soil, and its possibilities in the future service of mankind.

As it is written by an American a long chapter is given to the important soils of the United States which, though geographically interesting, will not appeal particularly to people of other countries. The longest chapter in the book on the Rôle of Fertilizers enables him to explain the most recent knowledge and experiments regarding the changes going on in the soil. It is in this connection that the analogies of the soil and animal body are ingeniously worked out, and the importance of the colloidal state explained. Another long chapter on Agriculture in the Countries of the World gives a brief but interesting history of Agriculture from the earliest times; here a great deal is said about the ideas and practices of the Romans, long extracts being made from the writings of Pliny.

The author has treated with freshness, and in a thoroughly up-to-date manner, a subject inherently interesting to the botanist, the chemist, and the practical farmer, and, in its bearing on the life and distribution of mankind, to the geographer. E. A. P.

GENERAL

The Right Honourable Sir Mortimer Durand, P.C., G.C.M.G., K.C.S.I., K.C.I.E. A Biography by **Brig.-General Sir Percy Sykes, K.C.I.E., C.B., C.M.G.**, etc. London: Cassell & Co., Ltd. 1926. $9\frac{1}{2} \times 6\frac{1}{2}$, pp. xii. + 356. *Eight Plates and Three Maps.* *25s. net.*

This biography has a very valuable historical interest, as Sir Percy Sykes has summarized very clearly the intricate history of Afghanistan and Persia during the eighteenth and nineteenth centuries in order to show the stage on which Sir Henry Durand and his son Sir Mortimer in his earlier life played their parts. And well they played them. Sir Henry as a young officer of Engineers won his laurels by blowing in the Kabul Gate of Ghazni in the first Afghan war in 1840. His rise was rapid, and he became Private Secretary to Lord Elphinstone, and, after a short spell of military duty in the second Punjab campaign in 1848, he passed quickly through some important posts in the Indian Political Service and became Foreign Secretary. He was finally appointed Lieut.-Governor of Punjab, being perhaps the only military political officer to hold charge of a major province. Not long after his appointment he was inspecting the town of Tank at the entrance of the Gomal Pass

on the North-West Frontier. His elephant was taken through a gateway which was not high enough for it, and he was crushed against the arch and killed, in January 1871.

Two years afterwards, in March, 1873, his son Mortimer arrived in Calcutta. After a rather unusual education in Switzerland and private schools he had passed into the Indian Civil Service at the age of twenty. In Calcutta he found many of his father's old friends at the top of the tree, and Sir Charles Aitchison, the Foreign Secretary, took him up. In two years he was an attaché, and after a short term in Rajputana he went up as Secretary with Sir F. Roberts to Kabul in 1879. In 1880 he became Under-Secretary in the Foreign Office, and in 1885 he was appointed Foreign Secretary when he was only thirty-five. He was specially selected for the Legation at Tehran in 1894, and left the Indian Service. From Tehran he passed to Madrid in 1900, and was appointed to Washington in 1903. Up to this time his career had been a meteoric triumph, but he did not please Mr. Roosevelt, the President, who wanted a personal friend at the Embassy, and he was recalled in 1906. It was a terrible blow to Durand, and Sir Percy Sykes shows that it was unfair treatment, but with his unusual education and his shy and reserved manner and want of large private fortune, he was perhaps not well suited by the U.S.A. post.

He was considered for the post of Governor of Bombay, but he was probably wise not to accept this, and until his death, in June 1924, he devoted himself mainly to literary work, for which he had always shown a strong leaning. He wrote some good verses and novels, but his best works were the lives of his father and of Sir Alfred Lyall, an old chief, and Sir George White, an old friend.

It will be seen that throughout his whole career he was engaged in political work. He played a useful part in the first Afghan War, in the demarcation of the Russo–Afghan Frontier, and in the conquest of Upper Burma, and, last and most important for him, in 1893 he settled with the Amir Abdul Rahman the north-western boundaries of India, known as the Durand Line. In Persia he completed the settlement of the eastern frontier of the country, and helped things through in the crisis on the death of the Shah Nasruddin, and he was a success in Madrid, where his bearing and manners must have commended him to the Spaniards. But the most active and perhaps the most useful part of his career was spent in India. It will be seen from this sketch that in his career he contributed considerably to the geography of India and Asia. The Russo–Afghan boundary, though it had a baptism of blood at Panjdeh in 1885, which nearly involved us in war with Russia, has stood the test of time well, and at present it is understood that we have no treaty obligations with Kabul which may compel us to undertake its defence.

The Durand Line has been criticized. It is not the administrative boundary of British India, which lies farther to the east and demarcates the districts under regular administration. It is the political frontier of India, and separates the Pathan tribes under our influence from those under the Amir. Part of it was demarcated by joint commissions, but where both sides of the line are held by pure Pathan tribes much of it was demarcated by British officers acting alone, and much of it is still not demarcated, and trouble is not seldom caused by intrigues across the line. To go into this question would be touching on politics, of which the Society keeps clear. At any rate, the line as interpreted during the past quarter of a century does give us a frontier which can be shown on the maps and which is on the whole enough for practical purposes, though the recognition of the complete freedom of Afghanistan from British

control by the Rawalpindi agreement of 1919 may necessitate the demarcation of the whole line.

Similar difficulties preclude any close examination of the major incidents of Mortimer Durand's career which was purely political. They are all well and clearly set forth by Sir Percy Sykes, who, though he began his political career under Durand in Persia, and has always been a close friend and admirer has done his work faithfully and impartially, and has fortunately secured the active cooperation not only of the family but also of the great chief under whom and of the officers with whom Durand worked. It is a fine record of an unusually fine career of a distinguished Indian civil servant and a great English gentleman. L. D.

Strategical Atlas of the Oceans.— Vaughan Cornish, D.Sc. London: Sifton, Praed & Co. 1925. 16 × 16½, pp. 6. *Five Maps.* 5*s. net.*

It seems a pity that Dr. Vaughan Cornish's Strategical Atlas of the Oceans was designed on such limited lines; in a work of so suggestive a title one might expect to find more detailed information than is provided by the five sketch-maps, which are all that this atlas comprises. One seeks in vain, for instance, for the Naval Bases of the United States of America, of France, Italy, Russia, and Japan, nor is there any indication of fuelling, wireless, or cable stations, either British or foreign. The maps are equally devoid of any information regarding docking accommodation, floating docks, or fortifications.

The title of this work is, indeed, somewhat misleading as to the scope of its contents; on opening the atlas we find that its name changes suddenly to "Singapore and Naval Geography," and the letterpress consists solely of a paper thus entitled which was read last year at a meeting of the Royal Colonial Institute. This paper presents an excellent *résumé* of the arguments in favour of constructing the Singapore Base, and as such the paper is interesting and instructive.

The outstanding feature of this atlas is that the author bases his maps on a very appropriate division of the globe into hemispheres centred respectively on the meridians 20° E. and 160° W. of Greenwich. The former hemisphere comprises the Atlantic and Indian Oceans, as well as the Mediterranean Sea; while the latter embraces the entire Pacific Ocean, from Hongkong to the Panama Canal. These the author terms the Mediterranean and Pacific Hemispheres. It is of particular interest that the meridian 110° E., which separates these two hemispheres, coincides with "the Washington Line" of the 1922 Naval Agreement. Turning the globe through an angle of 90° two other hemispheres are presented: namely, the East Indian, centred on the "Washington Line," and the Atlantic, centred on 70° W. Each of these four phases of the Earth's water surface is represented by a separate map, and on these maps the density of traffic on the different ocean trade-routes, and of the land populations which they serve, is indicated relatively by means of coloured shading. The whole forms a useful adjunct, without in any way being an exhaustive compendium, for the study of world-wide problems in naval strategy. J. H. M. C.

THE MONTHLY RECORD

EUROPE

Irrigation and Inland Transport in South-Eastern France.

VARIOUS problems concerning the utilization and regulation of the rivers of south-eastern France were discussed at the Congress of the "Ligue générale pour l'Aménagement et l'Utilisation des Eaux" held at Grenoble and Lyon in 1925. A summary by M. A. Cholley of the more important contributions appears in the *Annales de Géographie*, for May 1926. M. de Pampelonne dealt with the progress of irrigation in the region. At present in south-eastern France 171,000 hectares are irrigated; of these 85,000 ha. are in the Rhône valley (Drôme, Vaucluse, Bouches du Rhône); 23,000 ha. in Basse Provence (Var and Alpes Maritimes), and 63,000 ha. in the mountainous areas. In the Rhône valley the water is chiefly used for the meadows and market gardens, though in Camargue it is used in the vineyards. The water is distributed through channels for a certain number of hours each week. In Basse Provence, where the area is smaller and restricted to the coastal plains, it is devoted entirely to flowers and early vegetables. The annual yield per hectare is here the highest, from 30 to 40,000 francs. This enables the growers to install more elaborate irrigation equipment; the water is stored in small private reservoirs, and brought on to the land by hose or by small trenches, at any convenient time and with the minimum of loss. It is estimated that in Vaucluse 2500 ha. more could be irrigated; 33,000 ha. in the Bouches du Rhône; and the area in Basse Provence could be extended up to an altitude of 400 metres, which in the Alpes Maritimes alone would bring 10,000 ha. under irrigation. Projected works include barrages on the Verdon and Autuby canals on either bank of the Var to Grasse, Antibes, and Nice, and installations for using more water from the Rhône.

A further project, dealt with by M. A. Conche, was the much-discussed Mediterranean-Alsace canal. This would consist of three component parts: the Rhine–Rhône canal (Strasbourg–St. Symphorien), the Saône, and the Rhône. These sections are at present of varying utility: the Rhône–Rhine canal would require to be deepened, and the water supply improved, while the section formed by the Doubs is liable to floods. The best section is the Saône, which is easily navigable and open to barges of 280 tons. The traffic has however been greatly hit by railway competition, increased by the State subsidy. Recent returns show a very considerable falling-off from the figures for 1913. The Rhône has difficulties peculiar to itself: its fall is great and its course irregular, while it is exposed to the *brouillard*. For these reasons navigation requires skill and increased expenditure, while the equipment is also expensive. The whole scheme remains a project only, largely from the almost prohibitive outlay necessary. It is also argued that to carry it out would merely extend southwards the hinterland of the centres of the north-east, instead of enlarging the sphere of the Rhône industrial centres. If, however, the scheme were carried out in stages this might be avoided. The first step would be to stimulate the growth of traffic in heavy materials, coal from the north and the Rhineland, iron from Lorraine, phosphates from North Africa, etc., and establish industries which would consolidate the demand. Portions of the scheme might be carried out simultaneously: the creation of ports on the Rhône and Saône (plans already exist for works at Lyon, Saint-Fons, Macon, Chalon, etc.); a more effective union between the Rhône and Saône, and the regulation of the former river. Another stage,

which is now nearing completion, is the canal from Marseille to the Rhône. An account of this has been given by M. Alphonse Combarnous, since published as a pamphlet by the Marseille Chamber of Commerce. This is a sea-level canal 81 km. long, uniting Marseille to the Rhône near Arles: for a portion of its course the Etang de Berre has been utilized. One of the most serious undertakings has been the boring through the Nerthe massif of a 7 km. stretch, during which much trouble from subterranean water was encountered. It is also intended to use the Etang de Berre as a large harbour, with docks at Caronte and Port de Bouc, and the work already accomplished is said to have done much to stimulate industrial development in this area

AFRICA

Geology and Mineral Resources of Nyasaland.

We have received from Dr. F. Dixey, Government Geologist of Nyasaland, the reprint of a paper with the above title contributed by him to the *Mining Magazine* for April 1926. It forms a useful complement to other papers by him already noticed in the *Journal* (vol. **66**, pp. 78, 472; see also his paper on the Nyasaland section of the Great Rift valley in the August number). The great trough of the Rift Valley is the dominant feature of Nyasaland, but apart from the southward continuation of the trough in the Shire valley, the greater part of the land surface of the protectorate consists of plateaux rising irregularly one above the other, the less-elevated 3000 to 5000 feet above the sea, while one of the peaks of the Mlanje Mountains rises to 9843 feet. Geologically, Nyasaland is occupied by five principal groups of rocks differing widely in age, origin, and composition. Their surface distribution is shown on a sketch-map accompanying the paper. The Crystalline series, which outcrops over much the greater part of the area, and forms the basement on which the later formations rest, includes rocks of varying type and age, but all highly altered and without remains of animal life. They are now seen as gneisses and schists of varied composition, into which younger granites, etc., have been forced upwards, and in places brought to the surface by the wearing away of the masses above them. Next come the sedimentary rocks of the Mafingi series, mainly very resistant quartzites and conglomerates, devoid of fossils, and now represented only by a small remnant in the Mafingi Mountains in the north-west. Next, after a considerable gap in time, the Karroo beds, so widely represented in South and Central Africa, were laid down. They include a great variety of sandstones, mudstones, limestones, etc.; but economically the most important group is that of the shales, laid down in swampy depressions when conditions favoured a luxuriant vegetation, and forming the basis of all the coalfields of Central and South Africa. At the close of the period there were volcanic outbursts with great outpourings of lava, and it is to the down-faulting of certain sections at this period that the surviving coal-measures owe their preservation. The Karroo system includes abundant remains of animal life—amphibians, reptiles, etc., some very similar to those of the Beaufort Beds of South Africa. The last two great groups are the Dinosaur beds and the Lacustrine series, the latter in part contemporaneous with the great series of dislocations which gave rise to the Rift Valley, but including some of Recent age. Towards the close of this period volcanic activity again made itself felt, especially to the north of the lake. The lake itself has been subject to considerable vicissitudes since its first formation, and even at the present day its periodic rise and fall has had an important effect on the flow of its outlet and the

use of this as a waterway. After a period of fall, a rise has been maintained for the last few years, and there is a hope that the Shire may once more scour out its old channel.

Having thus sketched the geological formations, Dr. Dixey discusses the mineral resources yielded by each, which he shows to be extremely varied, even as at present known. The list includes gold, platinum, copper, tin, silver and lead, manganese, iron, graphite, talc, mica, and various other minerals, besides the coal and bauxite which seem to offer the most promising possibilities at the moment. Coal occurs both in the north and in the extreme south-west, and it has lately been proved that seams of good quality occur in the latter area only 40 miles from the existing railway at Chiromo. An important deposit of bauxite, or aluminium ore, was discovered in 1924 on Lichenya Plateau, Mlanje Mountains, being the only one of any consequence yet recorded from any part of Africa except the Gold Coast. If an average depth of only 7 feet of workable ore be assumed, the deposit contains not less than 20 million tons. The freight that would be provided by the development of these mineral resources might do much to justify the costly scheme for a bridge across the Zambezi to supply unbroken railway communication between the port of Beira and Nyasaland.

AMERICA

Tides and Currents in San Francisco Bay.

A large body of data accumulated during many years' observations on tides and currents in San Francisco Bay has been made generally available in Special Publication No. 115 of the United States Coast and Geodetic Survey (1925), the tidal section being dealt with by Mr. L. P. Disney, that on currents by Lieut. W. H. Overshiner. Such observations were begun over seventy years ago, records being obtained in 1852 for the tides, in 1856 for the currents. Systematic observations of the tides were begun in 1897, and have since been continued uninterruptedly, so that the present brochure, written in 1924, is based on a well-determined series of twenty-six years' observations. The first part deals with the data obtained at the Presidio Station by means of an automatic tide-gauge installed in lat. 37° 48′ N., long. 122° 27′ W., the observations being reduced to a staff the zero of which was connected by spirit-levels with adjacent bench-marks. The elements discussed include lunitidal intervals, duration of rise and fall, mean sea-level, the planes of half-tide, high-water, and low-water, the range of the tide, and so on, the variations from day to day, month to month, or year to year, due to inequalities in the motion of the moon within a nineteen-year cycle, being clearly explained. The maximum variation in the lunitidal interval between any two years of the period in question was about 14 minutes, and the similar variation in the duration of rise was 18 minutes. Mean sea-level also varies so considerably not only within the month or year, but also from year to year (due, no doubt, to varying meteorological conditions), that a long series of observations must be used before a well-determined sea-level datum can be obtained. The variation, *e.g.*, between the years 1913 and 1914 was as much as 0·30 foot. At Presidio it is lowest in spring and highest in autumn, but it has not been ascertained whether the year-to-year variations show any such periodicity.

There is a wide variation in the heights of the two high and two low waters of each day, and also in the monthly and yearly means of both, most of the latter variations being no doubt accounted for by the fluctuations in mean sea-level. The range of the tide varies from year to year in accordance with

the variation in the longitude of the moon's node within a nineteen-year period; but by using a nineteen-year series of observations this effect can be eliminated, the result giving a mean yearly range of 1·93 feet. A special section discusses meteorological and seismological influences upon the water-surface. A good illustration of the former effect is given by the record for 21 November 1910, when, with a falling tide, the surface was suddenly elevated 0·6 foot within ten minutes. About the same time there was a marked drop in barometric pressure, but the greater effect may have been due to a sudden wind from the south. A useful summary of all these time-relation ranges and inequalities is given in a table on pp. 33–34, after which the separate parts of the bay and its branches are dealt with separately.

The section on currents discusses past and present methods of observation, and describes the results gained in the several subdivisions of the area. For a current survey of a large harbour a carefully elaborated scheme is now put into operation, the whole area being divided into sections in each of which suitable stations are established, a control station being kept in operation continuously while the other stations are being occupied.

GENERAL

Scottish National Memorial to David Livingstone.

The early home of David Livingstone at Blantyre on the Clyde is now for sale, and a movement has been started to purchase the house and grounds as a Scottish National Memorial to the explorer. In addition to the purchase money, a considerable sum is required to put the house into repair, and adequately endow it as a museum for such Livingstone relics as can now be collected, as well as other exhibits illustrating the opening-up of Africa. For all these purposes, the representative committee, of which our President and the President of the Royal Scottish Geographical Society are members, has appealed for £12,000. Copies of an illustrated booklet containing further details of the scheme may be obtained from the Organizing Secretary, Mr. J. G. Harley, 36, Chalmers Street, Edinburgh. Subscriptions should be sent to the Hon. Treasurer, Mr. James MacGregor Hart, at 142, St. Vincent Street, Glasgow, C.2.

OBITUARY

Gertrude Lowthian Bell.

THE death of Miss Gertrude Bell at Baghdad, on July 11 last, closed a career which in more than one respect is unique. No other woman of recent time has combined her qualities—her taste for arduous and dangerous adventure with her scientific interest and knowledge, her competence in archæology and art, her distinguished literary gift, her sympathy for all sorts and conditions of men, her political insight and appreciation of human values, her masculine vigour, hard common sense and practical efficiency—all tempered by feminine charm and a most romantic spirit. She was, I believe, the only woman to be graded a Political Officer during the Great War, and the only one after it to be Oriental Secretary to a High Commissioner. Not given to any sort of self-advertisement, she escaped, thanks to lifelong indifference to what are called Feminist Movements, that advertisement by others which some distinguished members of her sex have suffered.

Gertrude Bell was born in 1868, eldest daughter of Sir Hugh Bell, second baronet. All her life she moved in a large privileged circle, and to enumerate her distinguished friends would be impossible here. Sufficient to say that among the closer of them were such men as Sir Alfred Lyall, the first Lord Cromer, Colonel Doughty-Wylie, V.C., Sir Valentine Chirol, Sir William Ramsay, Sir Percy Cox, and Lord Lloyd. She began early to train her mind, for she was not seventeen when she became a student of Lady Margaret Hall in Oxford. There, in 1887, she took first-class honours in the School of Modern History, being the earliest of her sex to win that particular distinction at Oxford. Her examiners never forgot either the keen features or the studiously smart attire of the nineteen-year-old candidate who asked them across the *vivâ voce* table more searching questions than they asked her.

She soon became well known in London and familiar with men and cities, being an enterprising traveller and a good linguist. Her taste for adventure found its earliest satisfaction in mountaineering, and during the 'nineties she made herself an expert Alpinist. On 24 July 1902 the seal was set on her competence by a first traverse of the whole arête between the Lauteraarhorn and the Schreckhorn, with ascent of the first-named peak. Seven days later with the same guides, Ulrich and Heinrich Fuhrer, she made an attempt on the Finsteraarhorn by its then unclimbed north-east buttress. The party got on to the arête and by the early afternoon, after very difficult rock and ice work, were in sight of the summit; but snow came on, and it was followed by a thunderstorm, whose lightning the ice-axes attracted. A crevice afforded shelter from stones and avalanches for the night, but the climbers dared not unrope themselves. Next day it snowed still, and after a perilous moment in a couloir, down which two of the three fell, the party could not descend further than the glacier, and had to spend a second night out, being 53 hours on the rope. On the third morning they reached the Grimsel in six hours with frost-bitten hands and feet, to find that they had been given up for lost. Altogether they had been nearly 60 hours on the mountain.* This side of Miss Bell's activities suggested to Dr. F. De Filippi her inclusion in the Himalayan expedition, which he led shortly before the war; but she declined his invitation.

Sir Frank Lascelles, a connection by marriage, gave her many opportunities while he served as British Minister successively at Sofia and Teheran; and experience of Persia induced her first literary effort, a volume of sketches of Persian scenes and life (1894). In a subsequent volume of translations from the Divan of Hafiz she boldly included an essay on Persian poetry in general. An intimate sorrow indirectly led to her visiting Palestine in 1900, and at Jerusalem she made friends with certain Druse sheikhs. They gave her an invitation to the dreaded "Jebel," and she made her way thither after a tour in the trans-Jordan districts. She was well received, and acquired a lasting

* This account is based on Miss Bell's MS. diary. Subsequently my attention was called to a letter by Ulrich Fuhrer to Mr. V. A. Fynn, published in the *Alpine Journal*, 34 (1921–2), p. 385. Writing in 1907, the guide gave substantially the same account, describing the extreme peril of the first night, when lightning struck the mountain and showers of stones were falling, and the desperate expedient adopted on the second day for re-crossing the avalanche-swept bergschrund. He says of the whole adventure: "The honour belongs to Miss Bell. Had she not been full of courage and determination we must have perished. She was the one who insisted on our eating from time to time." She also prevented her guides from drinking any alcoholic liquor during the climb.

Gertrude Lowthian Bell

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liking for Druses and a first acquaintance with Arabic as a vernacular—an acquaintance which she would continue to improve to the end of her life. Five years later she slipped through the hands of the Turks into the Jebel again, and this time held on her way northwards through the ill-known Safa steppe to Damascus. Thereafter she crossed Antilebanon and quartered the Orontes valley down to Antioch and Seleucia. This journey she described with rare sympathy and literary power in a book 'The Desert and the Sown' (1907), which, breathing the influence of Charles Doughty, is not unworthy of a place by his masterpiece. Whether for its matter or for its veracity or for its style, it takes rank among the dozen best books of Eastern travel.

From Alexandretta Miss Bell led her camp through Asia Minor to Konia, turning aside to visit Bin Bir Kilisse (Barata), to whose remains of early church architecture she was attracted through her acquaintance with Josef Strzygowski. She copied there an inscription on which now depends the dating of the whole group of churches; and at Konia she found Prof. W. M. Ramsay to help in its interpretation. This meeting began a fruitful friendship, and two years later she joined him and his wife in an expedition to Barata and neighbourhood, where, besides making a methodical study of the churches, she discovered Hittite remains on the peak of Mehaletch. The results were published in 1910 as a joint book, 'The Thousand and One Churches,' of which Miss Bell wrote the greater part. She revisited the site in 1909 on her way back from the second of her longer journeys through Arab lands.

For this journey she made Aleppo the starting-point. She went off alone, as before, with a native staff, her body-servant being one Fattuh, a powerful Armenian Catholic, who could pose on occasion as a Moslem. He has testified to the dauntless courage and indomitable endurance of his mistress. Other travellers of fame he had known, but none who, like *es-Sitt* (the Lady), started in any weather and carried on through water and mud to the waist. She made for the Euphrates beyond Mambij, and to the dismay of the authorities crossed the stream into country where post-roads and guard-houses are not, and tribes observe no law but their own. For good part of the long east-bank track from Rakka to Anah she remains our only authority. What tempted her was the chain of obscure and sand-choked stations and camps which once watched across the river the outposts of Rome and Byzantium; but on the way she heard talk of a much greater castle in the desert west of Kerbela. Re-crossing therefore at Anah and detaching herself with two or three attendants from her caravan, she struck off into notoriously unsafe Deleim country, and on the fourth day had her reward. The great four-square mass of Sassanian Ukhaidir rose out of the waste—vastest of desert ruins, long rumoured but not scientifically surveyed till a month or so before by one of the German excavators of Babylon. Of his visit she then learned for the first time, but she still thought it worth while to send to Kerbela for her caravan, and settle down to make the study which, in 1914, she would publish as a monumental book, 'Palace and Mosque of Ukhaidir.'

This study completed, she proceeded by Kerbela and Babylon to Baghdad—her first sight of the city which within ten years would be her home and within twenty her grave—and thence she went north up the Tigris valley, studying every kind of architecture from Assyrian to Mediæval, past Samarra and Kaleh Sherghat, where Andrae was exploring Asshur, to Mosul. By way of Zakho and Jezireh she next entered the Kurdish region of Tur Abdin, and there made a special study of ruined Armenian churches (published in Berchem's and Strzygowski's 'Amida,' 1910) before setting her face homeward by Diarbekr,

Kharput, Malatiyeh, Kaisariyeh, and Konia. All which doings, are they not written in 'Amurath to Amurath,' which, with its maturer science but somewhat less careless rapture, repeated the success of her first travel book?

In 1911 she was in Syria again, taking occasion to visit at Carchemish, which she had passed two years before, the British excavations begun that spring. She proved an object of deep interest to the Jerablus Arabs, who, regarding her as some new Queen Balkis, concluded that she came to wed the only member of the expedition party known to be heart-free, namely, T. E. Lawrence; and they were difficult to appease when she went her way, having done no more than add a friend, of strange future fame, to the company of her allies.

She had long nursed a desire to penetrate Arabia proper and see Nejd, where, of European women, only Lady Anne Blunt had been. By December 1913 she was ready, with a caravan encamped near Dumeir, on the north-eastern edge of the Damascus oasis; and in the middle of the month she vanished into the desert without Fattuh, who was in hospital. Her plan was to go far south, taking at first a route beyond Ottoman reach, to the east of Jebel Druz. Despite bitter weather, in which the thermometer fell nightly far below freezing-point, and despite also some trouble with a small Arab tribe of the Jebel, she accomplished the first stage in twenty-one days, her principal stations being Jebel Sais, an extinct volcano; the fort of Burqa (Bura); and the castles of Qasr el-Azraq, Qasr el-Amra and Kharaneh. From the last point she turned west to the Mecca railway, only to be caught at Ziza and detained in Amman by the Ottoman Government. After some ten days in the Belqa she was permitted to return at her own risk to the desert; and, once released and rejoined by Fattuh, she showed a clean pair of heels to the Turks. Through the *diras* of the Sukhur and Howeitat Arabs she pushed by Tuba and Bair down to Tor el-Tubaiq, keeping on a line which varied little from that followed by Mr. D. Carruthers in 1909; and after much cogitation she decided to avoid both Jof and Teima, and make straight across the south-western angle of the Nefud, by the Hazaim well, to the northern capital of Nejd. Thanks to the abundant pasture and many rainpools of that winter, she was able to keep within the Nefud and after a forty-days' journey from Ziza to appear before Hayyil. The young Emir was absent; but she was courteously received into the town by his uncle, Ibrahim, and lodged in the Summer Palace of Mohammed, greatest of Rashid Emirs of the past There, however, she found herself short of money and virtually a prisoner, the Rashids, in the absence of their Emir, shrinking from the responsibility involved either in allowing her to go about among a Wahabite population or in cashing a draft for £200, which she had presented from the Emir's *wakil* at Damascus. She had planned to pass on into the dominions of Ibn Saud and see his southern provinces, then unvisited, but this plan did not suit her hosts, and only when assured that she would relinquish it and go north towards Mesopotamia did the Emir's grandmother, Fatima, open the Treasury and cash the Damascus draft. Miss Bell insisted also on liberty to see the castle and town, and this was granted. She left on March 8 by the western Nejef road, which has rarely been travelled; and except for some dangerous moments with Shiah tribes at pasture near the Mesopotamian border, she reached Kerbela without adventure in fifteen days' hard riding. After a short stay in Iraq she returned to Damascus by a desert route which gave her occasion to visit the great Amarat chief, Fahad ibn Hadhdhal, and to see and plan several unknown ruins. She was never satisfied with mere travel or adventure unless she felt that she had advanced archæological science.

It is hoped that before long a fuller account of this bold journey may be given to the Society with the help of her diaries. But it will not be possible to recover in full her impressions of desert life of the purest kind or of the unique Arab society of Hayyil and its bloodstained chivalry. The more's the pity; for, thanks largely to the talk of a Circassian girl, Turkiyyeh, with whom she made great friends in Hayyil, she learned enough of its sinister annals to startle General Staffs during the War with curious and lurid details of Rashid politics, intrigues, and murders.

She had not recovered from the fatigue, physical and mental, of that journey when the War broke out. Eager, none the less, to serve, she was sent at first to Boulogne to control its organization for tracing the missing on the Front, and her uncompromising efficiency was quickly felt by such as thought to "do their bit" easily at a base. In 1915 she came to headquarters at Norfolk House. Her proper sphere was plainly the Eastern theatre; but, overworked and hard hit by the death of a friend at the Dardanelles, she resisted transference. In November however she appeared at the Intelligence Office at Cairo, and was set to collect and order information about Arabia, where a movement against the Turks was brewing. In the following January she was called to India by the Viceroy, Lord Hardinge, who first employed her on the compilation of the Gazetteer, and then sent her on to Basra to help the Political Service of Expeditionary Force D and maintain liaison with the Arab Bureau of Cairo. She quickly won the confidence of Sir Percy Cox, who made her an A.P.O. After our occupation of Baghdad she remained there in charge of desert affairs—a charge for which wide knowledge of tribal personalities and relationships peculiarly qualified her. True to her mission at Cairo she consistently supported our Sherifian policy, careless that, at the time, it was not generally approved in Mesopotamia or India; and ultimately, as was to be expected, she welcomed and warmly furthered the plan of preferring a Sherifian prince to the throne of Iraq. Meanwhile, summoned to the Paris Conference to advise on Arab affairs, she became, in the spring of 1919, one of the conspicuous personalities of that polyglot gathering, and added an experience of the European situation to a previous knowledge of Western and Turkish affairs shared by few in Iraq, and to the light which she gained by a tour in Syria under Feisal's short-lived *régime*—all of which made her, on her return in the autumn to Baghdad, a very valuable and effective counsellor. After the troublous episode of the Mesopotamian Revolt, no one did more to bring about and consolidate a settlement of the Iraq question on lines more promising than those contemplated at the conquest. As Arab Secretary to the High Commissioner she acted as liaison between him and the new King, each party being able to confide in her without committing himself to the other—a delicate confidential *rôle* which was not always understood or properly appreciated by those who lacked her knowledge and experience of a wider world. In the little house on the outskirts of Baghdad, which now became her home, she received all and sundry, and in particular the desert men, whose social status and connections she knew better than any other European. That she knew also the particular societies and problems of Mesopotamia is sufficiently demonstrated by the White Paper on British Administration in Iraq which she compiled in 1921. It is matter for profound regret that she did not live to repeat that masterly review or to deal at large with all the events—*quorum pars magna fuit*—of Iraq history since her first sight of the country in 1911.

Finding no sufficient service for administering archæological affairs in Iraq,

Miss Bell assumed control of the application of the Draft Law of Antiquities, and of the organization of a museum at Baghdad ; and it fell to her to further and watch the recent campaigns of excavation at Ur and Kish. This she did with great knowledge and tact, holding the balance between local claims and those of world science. It is due largely to her that archæology has so quickly been able to resume investigations into the rich antiquities of Babylonia. Her services to geography were recognized in 1918 by the award of our Founder's Medal, an honour only twice previously conferred on a woman. Her political services earned in the previous year the decoration C.B.E. Further official recognition of her lifelong devotion to the interests of the Empire and of science was overdue at her death, which came suddenly in sleep—as and where, perhaps, she would have chosen. She had worn herself to a shadow by long sojourn, summer and winter, in the trying climate of Baghdad, from which she rarely escaped except on brief trips to England, and on one to Persia while her former chief, Sir Percy Cox, was at the Embassy in Teheran. When she was home in 1923 she looked sadly wasted, but the sparkle, the quick interest, and the facile utterance, which made her one of the best of letter writers, as well as talkers, were still there, and her mind, at least, seemed ever young. There can have been few women equally endowed with both serious interests and social instinct, and fewer who have made so much of both. If any one ever did, Gertrude Bell warmed herself through and through at the fires of life ! D. G. H.

CORRESPONDENCE

"Dutch Geography in an English Text-book"

THE gravamen of your article on the above subject lay in two serious mistakes, both based on misprints in the *first* proofs of the *first* edition of the book (1913). No one called my attention to these till nearly a year ago ; but within twenty-four hours of hearing of them, I had arranged for a cancel of the pages in question. In the current edition, as I told you, we went further, and modified some of the "opinions" to which Dr. Beekman objected, and in which I had not what I considered higher *Dutch* authority.

As I have been widely accused of "deliberate malice" in this connection —which implies that I made the mistakes intentionally in order to say something nasty about the Dutch—I wish to clear up the matter of the "one-tenth" mistake.

You simply say : "Somehow the 1 got multiplied by 10." I much prefer the exact statement which I made to you. I wrote 1 %, but the compositor mis-read it as 10 p.c., and I failed to notice the mistake. Worse still, as I did not like the figures beginning, as they did, a new line and a new paragraph, I changed them into words as "one-tenth." The mistake, therefore, was in the chapter from the first, the proof bearing R. & R. Clark's date-stamp of March 28, 1913—so that the "malicious" mistake was in the book at the time when the Dutch Government was acknowledging—through the R.G.S. Secretary (Sir John Scott Keltie)—my regard for their interests as shown in the last paragraph of the chapter, which they had obviously read. L. W. LYDE.

University College, London,
21 September 1926.